(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 001 338 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
26.10.2016 Bulletin 2016/43

(21) Application number: **07734065.1**

(22) Date of filing: **22.03.2007**

(51) Int Cl.:
A47C 31/12 *(2006.01)* ***A47C 1/032*** *(2006.01)*
A47C 3/026 *(2006.01)* ***A47C 7/44*** *(2006.01)*

(86) International application number:
PCT/IB2007/000734

(87) International publication number:
WO 2007/110732 (04.10.2007 Gazette 2007/40)

(54) **Body support structure**

Körperstützstruktur

Structure de support du corps

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR

(30) Priority: **24.03.2006 DE 102006014109**
26.04.2006 DE 102006020007
26.04.2006 DE 102006020006
21.07.2006 DE 102006034307
27.07.2006 DE 102006035553
24.08.2006 DE 102006039606

(43) Date of publication of application:
17.12.2008 Bulletin 2008/51

(73) Proprietor: **Herman Miller Inc.**
Zeeland MI 49464-0302 (US)

(72) Inventors:
- **SCHMITZ, Burkhard**
  10585 Berlin (DE)
- **PLIKAT, Claudia**
  10585 Berlin (DE)
- **ZWICK, Carola**
  10585 Berlin (DE)
- **ZWICK, Roland**
  10585 Berlin (DE)

(74) Representative: **Boult Wade Tennant**
Verulam Gardens
70 Gray's Inn Road
London WC1X 8BT (GB)

(56) References cited:
BE-A- 381 555
DE-C1- 4 312 113
US-A- 4 387 876
US-A- 5 056 866
US-A- 5 348 372
US-A1- 2004 195 883

EP 2 001 338 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to a piece of furniture, in particular a body support structure, including for example a piece of furniture for sitting on or a piece of furniture for lying on, such as, for example, chair, armchair, stool, bed or sofa, according to the precharacterizing clause of claim 1.

[0002] DE 37 00 447 A1 discloses a piece of furniture for sitting on, in which the body weight of a person is detected via the loading of a seat part and in which the leaning force required in order to adjust the inclination of the back part is to be adjusted as a function of the weight force of the person. This automatic adaptation takes place by a spring being compressed by the weight force of the person, with the backrest carrier acting against this compressed spring. A disadvantage of a piece of furniture of this type for sitting on is that, here, only the weight force acting on the seat part can be detected. A weight force introduced via the back part or armrests which may be present cannot be correctly detected by the mechanism, since it is dissipated via the coupling of the carrier of the back part also to the seat carrier. This may possibly result in too weak a reaction force of the carrier of the back part.

[0003] Furthermore, US 5 080 318 discloses a control device for the inclination of a chair comprising a weighing device which causes an adjustment of a tension device for a leaf spring which supports an inclination of the seat, the adjustment travel being dependent on the weight of a user. A control device of this type has the disadvantage that the weighing of a user and therefore the setting of the leaf spring take place under load and are therefore sluggish and consequently slow and inaccurate.

[0004] Yet another similar body support structure is disclosed in US 5 348 372 A1.

[0005] The object on which the invention is based is to develop a novel body support structure, such as a piece of furniture, in particular a piece of furniture for sitting on, in which a spring mechanism which supports a reclining of a person can be adapted to the weight of the person, while weighing is to be smooth and is to take place quickly and accurately. Furthermore, the object of the invention is to develop a body support structure, such as a piece of furniture, in particular a piece of furniture for sitting or lying on, with a weighing mechanism for controlling the spring mechanism, in which the weighing mechanism can be produced cost-effectively.

[0006] This object is achieved, for example and without limitation, by means of the features of claim 1 and claim 13. The subclaims specify advantageous and expedient developments.

[0007] Further details of the invention are described by means of exemplary embodiments illustrated diagrammatically in the drawing in which:

Figures 1a-1d show diagrammatic views of four basic variants of a piece of furniture designed as a chair;

Figures 1e-1h show diagrammatic views of a standing and sitting person;

Figures 2a-2c show a diagrammatic illustration of a piece of furniture according to the invention in two positions;

Figure 3 shows an enlarged illustration of a weighing mechanism, a spring mechanism and a movement converter of a piece of furniture according to the invention;

Figures 4a-4c show diagrammatic illustrations of further design variants of a piece of furniture;

Figures 5a-5c show a diagrammatic illustration of a further piece of furniture according to the invention in a nonloaded and a loaded position;

Figures 6a-6e show five variants of a weighing mechanism, a spring mechanism and a movement converter of a piece of furniture according to the invention;

Figures 7a-7f show six illustrations of a further design variant of a piece of furniture according to the invention;

Figures 8a-8c show three illustrations of a movement converter;

Figures 9a-9c show diagrammatic illustrations of three further design variants of a piece of furniture according to the invention, and

Figures 10a-10d show four illustrations of a further design variant of a piece of furniture according to the invention.

[0008] It is to be noted that figures 4a - 4c do not represent embodiments according to the invention. These figures serve illustrative purposes only.

[0009] Figures 1a to 1d illustrate four basic variants of a body support structure 1 according to the invention, which are shown for example and without limitation as a piece of furniture for sitting on 2 in the form of a chair 3. All four pieces of furniture 1 comprise essentially a lower part 4, a middle part 5, an upper part 6 and a seat 7. It should be understood that the invention can also be incorporated, without limitation, into other body support structures such as beds, sofas, benches, vehicle and/or

aircraft seats, etc. All the components 4, 5, 6 carrying the seat 7 are also designated in summary as a base C. The seat 7 is in each case articulated on the upper part 6 which is connected to the middle part 5. The middle part 5 is carried by the lower part 4. The lower part 4 is designed in Figure 1a as a foot 8, in Figure 1b as a wall holder 9, in Figure 1c as a ceiling holder 10 and in Figure 1d as a swing 11. Figure 1a also shows, in principle, the arrangement of a height adjustment device 12 between the lower part 4 and the middle part 5.

[0010] Figures 1e to 1h show diagrammatic views of a person P and of a piece of furniture 1. In Figure 1e, the person P is standing in front of the piece of furniture 1. In Figure 1f, the person P is sitting upright in an upright sitting posture P1 on a seat part 13 of a seat 7 of the piece of furniture 1 and in this case subjects a back part 14 of the seat 7 to no or only insignificant load. In Figure 1g, the sitting person P reclines backward into a rearwardly inclined sitting posture P2 and in this case experiences a counterforce due to the back part 14 of the seat 7 of the piece of furniture 1. In Figure 1h, the person P leans forward into a forwardly inclined sitting posture P3.

[0011] Figures 2a and 2b show diagrammatic illustrations of a piece of furniture 1 according to the invention in two positions I (see Figure 2a) and II (see Figure 2b). The piece of furniture 1 comprises a lower part 4, a middle part 5, an upper part 6 and a seat 7. The seat 7 comprises a seat part 13 and a back part 14 which are connected to one another in an articulated manner by means of an axis of rotation 15. The seat part 13 is articulated rotatably with an axis of rotation 16 on the upper part 6, and the back part 14 is guided via an arm 17 with an axis of rotation 18 on the upper part 6, the arm 17 also being connected rotatably with an axis of rotation 19 to the back part 14. A first spring element 20 designed as a leaf spring 21 is fastened to the upper part 6. The first spring element 20 extends as a lever arm 51 approximately horizontally beneath the seat part 13 of the seat 7, and the seat part 13 lies with a projection 22 on the first spring element 20 in the region of a free end 23 of the latter. The first spring element 20 has a prestress and is supported between a tension end 24 and the free end 23 by a support 25 only when there is a corresponding load. The support is held by a slide 26. The support 25 and the spring element 20 form a spring mechanism SM. The support 25 is designed as a roller 27. The slide 26, which carries the support 25, is guided laterally movably in a guide 28 on the upper part 6 and lies with a lower end 29 on an inclined plane 30 of the middle part 5. The upper part 6 is guided movably upward and downward on the middle part 5 via two arms 31, 32 oriented parallel to one another, the arms 31, 32 being connected in each case to the middle part 5 and the upper part 6 rotatably about axes of rotation 33 to 36 running into the drawing plane. The downward movement or the upward movement of the upper part 6 together with the seat 7 is braked or assisted by a second spring element 37. The second spring element 37 is arranged between the upper part 6 and the middle part 5 and is designed as a helical spring 38. The spring element 37 and the arms 31 and 32 form a weighing mechanism WM. Finally, the middle part 5 is mounted on the lower part 4 rotatably about a vertical axis of rotation 39.

[0012] In Figure 2a, which shows the piece of furniture 1 in the position I, the piece of furniture 1 or the seat 7 is nonloaded and is in a position of rest. That is to say, no person is sitting on the piece of furniture 1. The upper part 6 therefore stands at a level N1 at which the second spring element 37 has to compensate only the weight of the upper part 6 and of the seat 7. In this position I of the piece of furniture 1, the slide 26 stands in a left position S1. A supporting of an inclination movement of the nonloaded seat 7 about the axis of rotation 16 in a direction of rotation w on the projection 22 takes place via the first spring element which is not in contact with the support 25. The nonloaded piece of furniture 1 according to the invention has to generate by means of its first spring element 20 only a comparatively low reaction force R1 to an inclination of the seat 7 about the axis of rotation 16 in the direction of rotation w, since, in this situation, only a torque M generated due to the dead weight of the seat 7 is to be absorbed. Basically, an interspace 95 having a thickness D95 lies between the support 25 or its contact surface KF and the first spring element 20 or the leaf spring 21 (see Figure 2c with a diagrammatic sectional view along the sectional line IIc-IIc illustrated in Figure 2a). This interspace 95 is brought about by a prestress of the leaf spring 21 which is selected such that the leaf spring 21 stands with play above the contact surface KF of the support 25 and a movement of the support 25 can take place according to a weight force 40 (see Figure 2b), without the leaf spring 21 impeding or braking the support 25.

[0013] In Figure 2b, which shows the piece of furniture 1 in the position II, the piece of furniture 1 or the seat 7 is loaded by the weight force 40 of a person, not illustrated, sitting upright and is in a working position. The upper part 6 is lowered to a level N2 at which the second spring element 37 has to compensate the weight of the upper part 6, the weight of the seat 7 and the weight force 40. In this position II of the piece of furniture 1, the slide 26 is in a middle position S2 and with its support 25 supports the first spring element 20 between its tension end 24 and its free end 23, insofar as the person leans backward and thereby increases the loading of the spring element 20. An increased reaction force R2 is available for supporting an inclination movement of the person together with the seat 7 about the axis of rotation 16 in a direction of rotation w as soon as the leaf spring 21 comes to lie on the support 25 as a result of the displacement of the person and engages said support 25 under itself with a engaging force LF. Thus the support 25 is clamped by a clamping force in its actual position. The loaded piece of furniture 1 according to the invention thus generates a reaction force R2 to an inclination of the seat 7 about the axis of rotation 16 in the direction of rotation w. The reaction force R2 is higher than the reaction force R1 due

to an additional support of the leaf spring 21 on the support 25 and is thus adapted to the loading of the piece of furniture 1. As soon as the person sitting on the piece of furniture 1 resumes an upright sitting position, this also gives rise in the position II to an interspace 95, shown in Figure 2c for the position I, between the leaf spring 21 and the support 25 or its contact surface KF. That is to say, the piece of furniture 1 regains the smooth movability of the support 25 with respect to the leaf spring 21 as soon as the person changes from a reclined sitting position into an upright sitting position. Between the position I and the position II, the spacings F1, F2 between the support 25 and the projection 22 vary as a function of the person's weight.

[0014] The difference between the levels N1 and N2 of the upper part 6 in positions I and II is designated as the weighing distance W1, and the spacing between the positions S1 and S2 of the slide 26 is designated as the displacement distance V1.

[0015] The upper part 6 and the middle part 5 thus form with one another a movement converter 41 which converts the weighing movement against the second spring element 37 into a displacement movement, by which the first spring element 20 is influenced in its reaction force R1 or R2 on the seat 7.

[0016] The second spring element 37 or the spring mechanism SM is influenced as a function of the weighing movement, although the weighing movement cannot be influenced by an inclination movement of a person sitting on the piece of furniture 1 and reclining. The weight force 40 of the person is detected completely, independently of his position on the seat 7, solely due to the articulation of the seat 7 on the upper part 6. The seat 7, shown in Figures 2a and 2b, is designed in the manner of a known synchronous mechanism which, when a person reclines in the seat 7, gives rise to a different increase or decrease in the inclination of the seat part 13 or of the back part 14. The arms 32, 33 and the spring element 37 form the weighing mechanism WM by means of which the weight force 40 of a person sitting on the seat can be detected. The weighing mechanism WM gives rise via the movement converter 41 to a setting of a spring mechanism SM according to the weight force 40 of the person using the piece of furniture 1. The spring mechanism SM is formed essentially by the first spring element 20 or the leaf spring 21 and the support 25, the support 25 cooperating with the leaf spring 21 only when a person sitting on the piece of furniture 1 reclines into a rearwardly inclined sitting position P2 described in Figure 1g.

[0017] Figure 3 illustrates a diagrammatic view of a movement converter 41 which is constructed in a similar way to the movement converter shown in Figures 2a to 2c and is arranged between a weighing mechanism WM and a spring mechanism SM. For simplification, an upper part 6 is shown here without articulation points for a seat.

[0018] The movement converter 41, the weighing mechanism WM and the spring mechanism are illustrated in three positions I, II and III. In position I, shown by thick unbroken lines, the arrangement is nonloaded. The arrangement is therefore not loaded by a person sitting on the seat, not illustrated. When the arrangement is loaded via the seat, not illustrated, with a first weight force 40 of a first person, the upper part 6 is lowered counter to a second spring element 37 in the direction of an arrow y' downward toward a middle part 5 into the second position II. The second position II is illustrated by thin unbroken lines. Lowering takes place according to the articulation of the upper part 6 on the middle part 5 via two parallel arms 31 and 32 on a circular path 42.

[0019] When the arrangement is loaded via the seat, not illustrated, with a second weight force 40a of a second person which is greater than the first weight force, the upper part 6 is lowered counter to the second spring element 37 in the direction of the arrow y' downward toward the middle part 5 into the third position III. The third position III is illustrated by thin broken lines. Lowering again takes place according to the articulation of the upper part 6 on the middle part 5 via two parallel arms 31 and 32 on the circular path 42. In positions I and II, the upper part has levels N1 and N2, the difference of which corresponds to a weighing distance W1. This weighing distance W1 is converted via a drive 43 and an output 44 into a displacement distance V1 which is defined as a path difference between positions S1 and S2 of a slide 26. The drive 43 comprises a guide 28 on the upper part 6 and an inclined plane 30 on the middle part 5. These two components give rise, due to a lowering of the guide 28 together with the upper part 6, to a lateral displacement movement of the slide 26 which forms the output 44. In other words, the upper part 6, together with the middle part 5 or with the transmission mechanism operating as a movement converter 41, forms a gear 45 for converting a weighing movement into a displacement movement. In positions I and III, the upper part has the level N1 and a level N3, the difference of which corresponds to a weighing distance W2. This weighing distance W2 is converted via the gear 45 into a displacement distance V2 which is defined as the path difference between the position S1 and a position S3 of the slide 26. The slide 26 slides in the guide 28 from the position S1 into the position S2, a support 25, fastened vertically movably to the slide 26, for a first spring element 20 moving on the upper part 6 along-a curved path 46 which runs at an approximately constant spacing with respect to a curved run of the first spring element 26 designed as a leaf spring 21. By the path 46 being coordinated with the run of the leaf spring 21, it is possible to avoid a jamming of the support 25 under the spring element 20 in any position of the support 25 or slide 26 and to ensure a smooth movement of the support 25. The smooth movement of the support 25 is implemented by the formation of an interspace 95, 96 and 97 in any position of the support 25, insofar as the piece of furniture 1 is not loaded by a reclining person. As regards the structural implementation of the interspaces, reference is made to Figure 2c which has similar validity for Figure 3. Owing to the

smooth moveability which the support achieves as soon as the person sitting on the chair assumes an upright sitting position, a sensitive readjustment of the position of the support 25 is also possible if, for example, the person using the chair grasps a heavy file and puts this down again later. The vertical moveability of the support 25 is achieved by the guidance of a shaft 47 of the support 25 in long holes 48 arranged on the slide 26. As a result, during the displacement of the slide 26, the support 25 can follow the path 46 independently of the run of the guide 28. In the position S3 of the slide 26, belonging to position III, the support 25 has been lowered, according to the run of the path 46, in the direction y' downward in the long holes 48. The path 46 is configured in its run in such a way that an undesirable jamming of the support 25 between the path 46 and the leaf spring 21 during weighing is prevented. The run of the path 46 is adapted to the run of the leaf spring 21. A return of the slide 26 out of the position S3 or S2 into the position S1 takes place, when the seat is relieved of the weight force acting on it, for example, by means of a tension spring 49 which connects the slide 26 to the upper part 6. Such a tension spring 49 is also provided, for example, for the pieces of furniture illustrated in Figures 2a and 2b. As already mentioned in the description of Figures 2a and 2b, the displacement of the support 25 influences the hardness of the leaf spring 21 with which the latter supports an inclination movement of a seat, not illustrated, on the upper part 6. In the nonloaded position I, the first spring element 20 basically already has a prestress, by means of which the seat, not illustrated, is already supported against a basic loading of the piece of furniture with, for example, 40 kg. Such a prestress is generated in a tension slit 72 for the leaf spring 21 by the leaf spring 21 being fixed between an upper counterbearing OG and a lower counterbearing UG. In a consideration of the lower counterbearing UG and the support 25, the lower counterbearing UG is to be defined as a first support and the support 25 as a second support for the leaf spring 21.

[0020] Furthermore, with regard to the weighing movement on the circular path 42, Figure 3 depicts a vertical component VK of the weighing movement and a horizontal component HK of the weighing movement. In the case depicted, the vertical component VK of the weighing movement corresponds to the weighing distance W2. In the present case, the vertical component VK is substantially greater than the horizontal component HK. Thus, the weighing result, while having the required accuracy, is falsified at most minimally.

[0021] Figures 4a and 4b show two variants of a piece of furniture 1 in a diagrammatic illustration. In both variants, the illustration of a lower part of the piece of furniture 1 has been dispensed with. Figure 4a shows a middle part 5 which carries an upper part 6 via two arms 31 and 32. A seat 7 is articulated on the upper part 6 by means of a synchronous mechanism already described with regard to Figures 2a and 2b. In contrast to the pieces of furniture described above, a first spring element 20, which supports an inclination movement or rotational movement of the seat 7 about an axis of rotation 16 in a direction of rotation w, is designed as a helical spring 50 which is arranged on a slide 26. The slide 26 is guided, in a similar way to the designs shown in Figures 2a to 3, on the upper part 6 in a guide 28 and slides with a lower end 29 on an inclined plane 30 which is formed on the middle part 5. The upper part 6 guided upward and downward on the middle part 5 on arms 31 and 32 is supported against the middle part 5 by means of a second spring element 37. Between a projection 22 of the seat 7 and the first spring element 20 is arranged a lever 51 which is articulated on the upper part 6 rotatably about an axis of rotation 52. The seat 7 is supported from above on the lever 51 via a projection 22. The lever 51 is supported, in turn, by the first spring element 20 acting against the lever 51 from below as a support 25, when a person, not illustrated, sitting on the piece of furniture 1 reclines. As long as the person sitting on the piece of furniture 1 does not recline, the lever 51 is sufficiently supported by the force of a spring 98 which is designed as a helical spring 99. Owing to the spring 98, during a traveling movement of the first spring element 20 there is always an interspace 96 between the first spring element 20 and the lever 51, insofar as the person sitting on the piece of furniture 1 does not recline. Figure 4c illustrates, in this regard, a view of a detail, designated in Figure 4b as IVb, which applies to Figures 4a and 4b. The lever 51, the spring 50 and the spring 98, together with a spring mechanism SM, and the arms 31, 32 and the spring 37 thus form a weighing mechanism WM. A movement converter 41 connecting the weighing mechanism WM and the spring mechanism SM is designed according to the movement converter shown in Figures 2a and 2b. As a function of a position S1, S2 or S3 of the slide 26 together with the first spring element 20, different engagement points 53 of the first spring element 20 operating as a support 25 give rise on the lever 51 to a supporting force of differing magnitude against an inclination of the seat 7 about the axis of rotation 16. The description relating to Figure 4a applies likewise to the piece of furniture 1 shown in Figure 4b. The only difference from Figure 4a is that, here, a seat part 13 and a back part 14 of the seat 7 stand at a fixed angle to one another.

[0022] Figures 5a and 5b show a further design variant of a piece of furniture 1 according to the invention in two different positions I and II, the illustration of a lower part of the piece of furniture 1 having been dispensed with in both figures. An upper part 6 is guided movably upward and downward on a middle part 5 by means of an arm 31 rotatably about axes of rotation 33, 34 and a roller 55 guided on a cam 54 and is supported on the middle part 5 via a second spring element 37. Arranged on the upper part 6 is a first spring element 20, on which a seat 7 articulated on the upper part 6 rotatably about an axis of rotation 16 is supported with a projection 22 against an inclination movement about the axis of rotation 16 in a direction of rotation w. A displacement of a support 25

under the first spring element 20 designed as a leaf spring 21 is achieved by means of a movement converter 41 which connects a weighing mechanism WM and a spring mechanism SM to one another. The movement converter 41 comprises an articulated lever 56 which is composed of a lower lever 56a and an upper lever 56b. The lower lever 56a is connected fixedly to the middle part 5 and is connected to the upper lever 56b in a rotationally articulated manner about an axis of rotation 57. The upper lever 56b carries the support 25 which is articulated on this rotatably about an axis of rotation 58. A lowering of the upper part 6 together with the seat 7 as a result of loading of the seat 7 by a weight force 40 causes a displacement movement of the support 25 out of a position S1 into a position S2, said displacement movement being caused by the articulated lever 56. The movement converter 41 converts a weighing movement of the upper part 6, in which the support 25 is taken up on the upper part 6, into a displacement movement directed laterally in the direction of an arrow x. In the position II of the piece of furniture 1, as illustrated in Figure 5b, the support 25 stands in the position S2 as a result of the loading of the seat 7 with the weight force 40 and causes the seat 7 to be supported against an inclination movement according to the weight force. When the piece of furniture 1 is relieved of the weight force 40, the second spring element 37 raises the upper part 6, together with the seat 7, and the support 25 is retracted by the articulated arm 56 in the direction of an arrow x' into the position I shown in Figure 5a. The seat 7 is composed of a seat part 13 and of a back part 14, the back part 14 being articulated resiliently on the seat part 13 via an elastic element 59. In the seat 7 illustrated in Figures 5a and 5b, therefore, essentially an inclination movement of the seat part 13 is supported by the first spring element 20. The back part 14 can spring back even further, independently of this, about an axis of rotation 15 of the seat 7. The cooperation of the support 25, of the upper part 6 and of the leaf spring 21 is shown as a detail in Figure 5c according to the section Vc-Vc marked in Figure 5b. As in the previous exemplary embodiments, the support 25 and the leaf spring 21 are spaced apart from one another due to an interspace 96 having a thickness D96, as long as a person sitting on the piece of furniture 1 does not recline. The support 25 is guided in a slot N on the upper part 6.

[0023] Figures 6a to 6e illustrate diagrammatically further design variants of weighing mechanisms WM and movement converters 41 for pieces of furniture 1 according to the invention. The arrangement shown in Figure 6a comprises a middle part 5 and an upper part 6, the upper part 6 being guided movably upward and downward in a bore 60 in the middle part 5. The upper part 6 is seated with a column 61 in the bore 60, the column 61 having a duct 62 which opens toward the bore 60 and leads into a boom 63 of the upper part 6. The duct 62 is provided for conducting a hydraulic fluid 64 out of a reservoir 65, formed by the bore 60, through the duct 62 into the boom 63 as a function of a weight force, acting on the upper part 6, of a person, not illustrated, sitting on a seat articulated on the upper part 6. In the boom 63, the hydraulic fluid 64 acts on a piston 66 which is supported against the upper part 6 by means of a second spring element 37. The piston 66 carries a support 25 which is displaceable on a path 46 beneath a first spring element 20 and which determines the counterforce of the first spring element 20 against an inclination movement of the seat, not illustrated. When the seat is relieved of the weight force, the hydraulic fluid is pressed back through the duct 62 into the reservoir 65 by the piston 66 onto which the second spring element 37 presses. The upper part 6 together with the seat is raised by means of the hydraulic fluid 64 which then presses onto a piston surface 67 of the column 61.

[0024] The design variant, illustrated in Figure 6b, of a weighing mechanism WM and a movement converter 41 has an operating mode and design comparable to the arrangement shown in Figure 6a. In contrast to this, here, the force transmission medium used is a magnetorheological fluid 68 which is guided in the reservoir 65 and in the duct 62 in concertinas 69 and 70 in order to ensure optimal sealing off.

[0025] The arrangement illustrated in Figure 6c has an operating mode comparable to the arrangement shown in Figure 6b. In contrast to this, the upper part 6 is not guided in the middle part 5 via a column, but, instead, has a guide by means of arms 31, 32 which is known, for example, from Figures 2a and 2b.

[0026] Figure 6d shows a purely mechanical variant. In this, an upper part 6 is guided with a column 61 in a bore 60 of a middle part 5, a second spring element 37 designed as a helical spring 38 being arranged between the column 61 and the middle part 5. A slide 26 is guided in a way known from previous exemplary embodiments on a boom 63 of the upper part 6 in a guide 28. The slide 26 has a support 25 and cooperates with an inclined plane 30. As a result, during a weighing movement of the upper part 6, the slide 26 is moved laterally under a first spring element 20. When the movement converter 41 is relieved of a weight force causing the weighing movement, a tension spring 49 draws the slide 26 in the direction of the column 61 again.

[0027] The arrangement illustrated in Figure 6e has an upper part 6 which is guided with a column 61 in a bore 60 of a middle part 5 against a second spring element 37. A weighing distance occurring during the compression of the upper part 6 as a result of a loading of a seat, not illustrated, articulated on the upper part 6 is detected by a sensor 71. A piston 66 is movable motorized in a guide 28 according to the detected weighing distance. The transfer of control signals between the sensor 71 and the motorized movable piston 66 takes place in wired or wireless form. A support 25 is arranged with play in the vertical direction on the motorized movable piston 66 in a way known from previous exemplary embodiments. This moves the piston 66 under a first spring element 20, designed as a leaf spring 21, as a function of the detected

weighing distance. When the upper part 6 or the seat arranged on the upper part 6 is relieved, the upper part 6 is raised by the second spring element 37. This lifting movement is likewise detected by the sensor 71 and causes a return movement of the motorized movable piston 66.

[0028] In the design variants illustrated in Figures 6a to 6e, the first spring element 20 and the support 25 cooperate according to the description relating to Figures 2a to 2c. In particular, the supports 25 are designed according to Figure 2c, and between the first spring element 20 and the support 25 there is no interspace only when a person sitting on the piece of furniture 1 reclines.

[0029] Figure 7a shows a perspective illustration of a piece of furniture 1 according to the invention. The piece of furniture 1 stands in a nonloaded position I and comprises a base C and a seat 7 arranged on the latter. The base C comprises a lower part 4, a two-part middle part 5a, 5b and a two-part upper part 6a, 6b. The lower part 4 comprises a base 75 with wheels W, a height adjustment device 12 and a carrier 76 arranged on the latter. The carrier 76 has two carrying arms 76a and 76b, on which the middle parts 5a, 5b are arranged. On each of these two middle parts 5a, 5b is articulated one of the upper parts 6a, 6b (see also Figures 7b and 7c). The two upper parts 6a, 6b carry the seat 7. The seat 7 comprises a right carrier 77 and a left carrier 78 (see also Figure 7c), and these carry a cloth covering B. The two carriers 77 and 78 have in each case an upper leg 77a and 78a and a lower leg 77b, 78b. These are connected in each case by means of at least two linking members 79, 80 (see also Figure 7c).

[0030] In Figure 7b, the piece of furniture 1 shown in Figure 7a is illustrated in the nonloaded position I in a side view from the direction of an arrow IXb. This side view shows how the upper part 6b is guided on the middle part 5b via arms 31b and 32b. The upper part 6a is also guided correspondingly on the middle part 5a via arms 31a and 32ab (see Figure 7a).

[0031] Figure 7c illustrates the piece of furniture 1 without the cloth covering and without the height adjustment device and the base, once again in the nonloaded position I. It can be seen in this view that the upper parts 6a, 6b of the piece of furniture 1 are not connected to one another directly. In the exemplary embodiment illustrated, the carriers 77, 78, too, are connected to one another only by means of the cloth covering, not illustrated. According to design variants indicated by broken lines, the upper parts 6a, 6b and/or the carriers 77, 78 are connected by means of at least one flexible or rigid crossmember 81 or 82. Alternatively or additionally to this, there is also provision for connecting the upper part 6a and the carrier 78 and/or the upper part 6b and the carrier 79 via at least one diagonal crossmember. The upper legs 77a and 78a of the two carriers 77 and 78 are supported in each case with projections 22a and 22b on spring elements 20a, 20b of the two spring mechanisms SM, the spring elements 20a, 20b being designed as leaf springs 21a and 21b.

[0032] Figure 7d illustrates a sectional view, from a direction IXd shown in Figure 7a, of the movement converter 41a formed between the middle part 5a and the upper part 6a, the piece of furniture 1 also standing in the nonloaded position I here. The middle part 5 is carried by the carrying arm 76a belonging to the lower part 4 and is screwed to said carrying arm via screws 83a, 83b. The upper part 6a is articulated movably upward and downward on the middle part 5a via the parallel arms 31a, 32a which are mounted rotatably with axes of rotation 33 to 36 on the upper part 6a and the middle part 5a respectively. The seat 7 is articulated rotatably on the upper part 6a via two axes of rotation 16 and 84. The seat 7 is articulated at the axis of rotation 16 via the upper leg 77a of the carrier 77 and at the axis of rotation 84 via the lower leg 77b of the carrier 77. Furthermore, the first spring element 20a is tension-mounted with a tension end 24a into the upper part 6a. The upper leg 77a of the right carrier 77 of the seat 7 bears with the projection 22a against a free end 23a of the leaf spring 21a. The seat 7 or the right carrier 77 is thereby supported on the first spring element 20a in a direction of rotation w. The leaf spring 21a is not only tension-mounted into the upper part 6a, but is supported in a middle region 85 against the upper part 6a by a support 25a when a person sitting on the seat reclines. In the nonloaded position I shown in Figure 7d, there is an interspace 95 between the support 25a and the leaf spring 21a, and therefore these two components have no operative connection, so as not to brake a displacement of the support 25a taking place during a loading of the seat 7. This interspace 95 is achieved by means of a corresponding prestress or orientation and/or a corresponding shaping of the leaf spring 21a. The leaf spring 21a and the support 25a form a spring mechanism SM. The support 25a is arranged on a toothed slide 86 which is guided laterally displaceably in a guide 28a on the upper part 6a and forms an output body 86a. The toothed slide 86, or linear/curvilinear rack or gear, cooperates with a toothed quadrant 87, or rotary gear, which is fastened to the upper part 6a rotatably about an axis of rotation 88 and forms a drive body 87a. The toothed quadrant 87 has a slotted guide which is designed as a long hole 89. A pin 90 which is fastened to the middle part 5a engages into the long hole 89. The upper part 6a is guided on the arms 31a, 32a against a downwardly directed movement and is supported via a second spring element 37a. The second spring element 37a is designed as a leaf spring 91a and is held with a tension end 92a in the middle part 5a. The upper part 6a acts with a bolt 93a on a free end 94a of the leaf spring 91a. The leaf spring 91a and the arms 31a, 32a together form a weighing mechanism WM. A mechanical interlinking of the weighing mechanism WM and of the spring mechanism SM takes place by means of the movement converter 41a. When the seat 7 is loaded with a weight force, the upper part 6a, on which the seat 7 is supported, is supported on the second spring element

37a and in this case is lowered slightly with respect to the position I shown in Figure 7d. Along with the upper part 6a, the toothed quadrant 87 is also moved downward, and the pin 90 fastened rigidly to the middle part 5a with respect to the upper part 6a causes a rotation of the toothed quadrant 87 about its axis of rotation 88 in the direction of rotation w. The rotating toothed quadrant 87, during its rotational movement, takes up, or meshes with, the toothed slide 86 and the support 25a fastened to the latter and transports or translates this support to the left in the direction of the free end 23a of the leaf spring 21. A spacing F1 between the support 25a and the projection 22a is thereby reduced (see Figure 7d). This reduced spacing between the support 25a and the projection 22a then causes a greater supporting of the seat 7 against an inclination movement of the seat 7 about the axes of rotation 16, as compared with the position shown in Figure 7d, when the person sitting on the seat 7 reclines (see also Figure 7f). A left movement converter 41b (see Figure 7c) is designed similarly to the right movement converter 41a described above in detail. The piece of furniture 1 thus has a seat 7 which has two weighing mechanisms WM and two spring mechanisms SM which are connected in each case by means of a movement converter 41a, 41b. As a function of the position of a person sitting on the seat 7 of the piece of furniture 1, these two components are loaded proportionately with a weight force of the person and have corresponding reaction forces of the spring mechanisms SM against an inclination movement of the seat 7 directed in the direction of rotation w.

[0033] Figure 7e again depicts, in an enlarged illustration, the right movement converter 41a shown in Figure 7d, with the associated weighing mechanism WM and the associated spring mechanism SM, in the nonloaded position I. An illustration of the seat 7 and of the lower part 4 has been dispensed with here. Reference is made to the description relating to Figure 7d.

[0034] Figure 7f then shows a position II in which the seat 7, not illustrated, is loaded with a weight force of a person sitting upright. In comparison with Figure 7e, the rack 86 together with the support 25a of the spring mechanism SM has been displaced in the direction of the free end 23a of the leaf spring 21a. This displacement movement over the displacement distance V1 is the result of a weighing movement of the upper part 6a over a weighing distance W1, where, for example, $W1 = 2.5 \times V1$. A step-up of the weighing movement generated by the weighing mechanism WM thus takes place in the movement converter 41a. That is to say, even with a small weighing movement, a sensitive setting of the spring mechanism SM can be carried out on account of the step-up. The setting of the spring mechanism SM and consequently the counterforce against an inclination movement of the seat about the axis of rotation 16 are generated as a function of the weight force with which a person acts on the seat. The counterforce is set by the variation in the spacing between the support 25a and the projection, acting on the leaf spring 21a, of the seat 7. In the loading situation illustrated in Figure 7f, too, there is still an interspace 96 between the support 25a and the leaf spring 21a, as long as the person sitting on the seat does not recline.

[0035] Figures 8a to 8c show once again in detail the weighing and inclination on a further structural unit consisting of the weighing mechanism WM, movement converter 41a and spring mechanism SM, the structural unit being modified slightly, as compared with Figures 7a to 7f. Figure 8a shows a support 25a in a nonloaded position I of the piece of furniture. The seat, not illustrated, is supported via a projection 22a, symbolized by a triangle, on a first spring element 20a which is designed as a leaf spring 21a and which is tension-mounted on an upper part 6b between a lower counterbearing UG and an upper counterbearing OG. In the nonloaded position I illustrated, there is no operative connection between the support 25a and the leaf spring 21a. Instead, to avoid friction, a first interspace 95 having a thickness D95 is formed between the support 25a and the leaf spring 21. As soon as the seat part of the seat, not illustrated, is loaded by a person sitting down in an approximately upright sitting position, the support 25a moves under the leaf spring 21a into a position II shown in Figure 8b. During this movement of the support 25a, there is no operative connection to the leaf spring 21a. As long as the person does not recline out of the upright sitting position, an interspace 96 having a thickness D96 is still maintained between the support 25a and the leaf spring 21a, although, under certain circumstances, the weight force of the person already acts in a small fraction on the leaf spring 21a via the projection 22a. Thus, while the person is sitting down and as long as the person remains seated in the upright sitting position, a very smooth and therefore rapid follow-up of the support 25a under the leaf spring 21a is still possible, since an interspace 95 is constantly present. This is advantageous, for example, when the person sitting upright subsequently increases his weight by grasping a heavy file and reclines with this. Owing to the rapid and smooth adjustability of the support 25a, the weight of the heavy file is detected for the counterforce to be generated, even before the person reclines. Supporting which is too soft can thereby be avoided. An operative connection or contact between the support 25a and the leaf spring 21a occurs only when the person reclines out of his upright sitting position, since weight-dependent supporting is required only for reclining. The increased and weight-dependent counterforce is generated, after a slight compression of the leaf spring 21a over a spring travel W96 (see Figure 8b) corresponding to the thickness D96 of the second interspace 96, by the leaf spring 21a coming to lie on the support 25 (see Figure 8c). The leaf spring 21a engages the support 25a under itself with a engaging force LF and thus prevents a displacement of the support 25a until the person resumes an upright sitting position according to Figure 1f or stands up. The contact thus occurring or operative connection thus oc-

curring between the leaf spring 21a and the support 25a leads to an increase in the spring force which acts counter to the seat at the projection 22a of the latter. The support 25a then forms a second lower counterbearing UG2, the two lower counterbearings UG and UG2 having a spacing L2 with respect to one another (see Figure 8a). This spacing L2 varies in proportion to the weight force of a person sitting on the piece of furniture. In position I, the lower counterbearing UG and the second lower counterbearing UG2 have a smaller spacing L1 with respect to one another.

[0036] Figure 9a illustrates a further design variant of a piece of furniture 1 according to the invention. The piece of furniture 1 is designed as a piece of furniture 2 for sitting on or as a chair 3 and comprises a seat 7 which is arranged on a base C. The chair 3 is shown in a non-loaded position I. The base C comprises a lower part 4, a middle part 5 and an upper part 6. The middle part 5 is formed essentially by a housing 200 which is designed as a quiver 201 and is plugged in a bore 202 of the lower part 4. The upper part 6 comprises a carrier 203 for the seat 7 and is connected to the middle part 5 by means of a height adjustment device 12. The height adjustment device 12 comprises a settable spring AS designed as a pneumatic spring 204, an axial bearing 208 and a spring element designed as a helical spring 38. A pressure tube 205 of the pneumatic spring 204 is fastened in a known way in a bore 206 of the carrier 203. In addition to the pressure tube 205, the pneumatic spring 204 comprises a piston rod 207 which is guided in the pressure tube 205. The axial bearing 208 comprises an upper disk-shaped ring 209 and a lower pot-shaped ring 210 which has a collar 211. The axial bearing 208 is fastened to a free end 207a of the piston rod 207. The pneumatic spring 204 is supported via the collar 211 of the axial bearing 208 on a bottom 212 of the middle part 5 via the helical spring 38. Above the helical spring 38, the pneumatic spring 204 is guided slidably with its pressure tube 205 on the lower part 5. A weighing mechanism WM is thus formed between the middle part 5 and the upper part 6 by the height adjustment device 12. A movement converter 41 comprises a Bowden cable 213 and a lever mechanism LM designed as a lever 214. The Bowden cable 213 consists of a wire 215 and of a hose 216 in which the wire 215 is guided. The lever 214 is fastened to the upper part 6 or the carrier 203 rotatably about an axis of rotation 217. The lever 214 has a lower free end 214a and an upper free end 214b. On the upper free end 214b is formed a long hole 218 in which a support 25 is guided. The support 25 is movable on a sliding surface 219 of the carrier 203 under a spring element 20 designed as a leaf spring 21 in the direction of an arrow x', the traveling movement being generated by a rotation of the lever 214 about its axis of rotation 217. The lower end 214a of the lever 214 is connected to the collar 211 of the lower ring 210 of the axial bearing 208 by means of the wire 215 of the Bowden cable 213. The housing 200 which forms the middle part 5 and the carrier 203 form in each case a counterbearing 220, 221 for the hose 216 in which the wire 215 is guided. During a loading of the seat 7, the lowering of the upper part 6 counter to the helical spring 38 leads, independently of a height setting preselected by means of the pneumatic spring 204, to a traveling movement of the support 25 in the direction of the arrow x'. The wire 215 of the Bowden cable 213 is drawn downward by the lower ring 210 of the axial bearing 208 in the direction of an arrow y'. The lower ring 210 of the axial bearing 208 forms a fastening device CD for the Bowden cable 213. After a relief of the seat 7, a spring 222 draws the lever 214 back again into the position shown in Figure 9a. The leaf spring 21 and the support 25 form a spring mechanism SM. The distance over which the upper part 6 travels into the middle part 5 when the seat 7 is loaded by a person sitting down upright onto the seat 7 against the helical spring 38 is converted via the Bowden cable 213 and the lever 214 into a traveling movement of the support 25. The support 25 is thereby displaced under the leaf spring 21 as a function of the weight of the person sitting upright on the seat 7. The leaf spring 21 comes to lie on the support 25 only when the person sitting on the seat 7 reclines and generates an increased torque about a horizontal axis of rotation 16, via which the seat 7 is connected pivotably to the upper part 6. A torque which the person in the upright sitting position generates about the axis of rotation 16 is absorbed via a prestress of the leaf spring 21. This prevents the situation where the leaf spring 21 comes to lie on the support 25 before the latter has reached a position appropriate to the person's weight. An operating element A, which is connected to the Bowden cable 213 instead of the lower ring 210, is also illustrated as a design variant in Figure 9a by broken lines. The operating element A allows a manual setting of the body weight of a person sitting on the piece of furniture 1. The operating element can be operated with minimal effort by a person sitting upright or bent forward on the piece of furniture 1.

[0037] Figure 9b illustrates a view of a detail of the chair 3 shown in Figure 9a. The view of a detail shows a design variant in which the seat 7 and the upper part 6 are connected by means of a toggle lever 223. The toggle lever 223 serves for absorbing the torque M which the person sitting in an upright sitting position on the seat 7 generates about the axis of rotation 16. The above-described prestress of the leaf spring 21 may thereby be largely dispensed with. The toggle lever 223 comprises an upper lever 224, which is articulated rotatably on the seat 7, and a lower lever 225, which is articulated rotatably on the upper part 6. The upper lever 224 and the lower lever 225 are connected to one another by means of a joint 226. The joint 226 forms an axis of rotation 227. A spring element 228, which is designed as a spring 228a, is connected to the joint 226 and draws the lower lever 224 of the toggle lever 223 against an abutment 229 which is fastened to the carrier 203. The toggle lever 223 is thereby brought into an approximately extended position. The abutment 229 is designed such that the

levers 224 and 225 form with one another an angle α of about 175°. The toggle lever 223 consequently buckles only when the person reclines and therefore generates an increased torque about the axis of rotation 16. Owing to the choice of the angle α, at which the levers 224 and 225 stand in relation to one another, and/or to the choice of the spring force of the spring element 228 and/or to the arrangement of the toggle lever 223 between the seat 7 and the upper part 6, it is possible to adapt a blocking mechanism 230 to the special geometry of the chair 3. When the toggle lever 223 buckles as a result of loading, the leaf spring 21 assumes the support or supporting of the seat 7. At the point in time when the toggle lever 223 buckles in the direction of an arrow x, the support 25 has already been displaced in the direction of the arrow x' by the person according to the loading of the seat 7.

[0038] Figure 9c illustrates once again the view, known from Figure 9b, of a detail of the chair 3 shown in Figure 9a. In contrast to Figure 9b, the seat 7 is articulated on the upper part 6 via two additional levers 230 and 231. By means of the lever 231, a projection 22 with which the seat 7 lies on the leaf spring 21 is forced onto a circular path 233 predetermined by the lever 231.

[0039] Figures 10a - 10d illustrate a design variant of the seat shown in Figures 7a to 7d, in which a weighing mechanism WM and a movement converter 41 are designed similarly to the chair shown in Figure 9a.

[0040] Figure 10a shows a side view of a chair 3. The chair 3 comprises a base C and a seat 7. The base C comprises a lower part 4, which receives a middle part 5 in a bore 202, and an upper part 6, which is connected to the middle part 5 via a weighing mechanism WM designed as a height adjustment device 12. In the side view illustrated, a carrier 77 can be seen, which is articulated on the upper part 6 with an upper leg 77a rotatably about an axis of rotation 16 and rotatably with a lower leg 77b about an axis of rotation 84. The chair 3 also has a second carrier which is concealed by the first carrier 77 in the illustration of Figure 10a. As regards the arrangement of the second carrier, reference is made to Figure 7c which shows a chair with a comparable construction. The seat 7 is formed essentially by the two carriers 77 and a body support member, configured in one embodiment as a cloth covering B, which bridges and connects the carriers 77.

[0041] The two legs 77a and 77b are connected to one another via a plurality of linking members 79. The two carriers 77 of the seat 7 are supported on the upper part 6 in each case via a spring mechanism SM. The seat 7 is rotatable together with the upper part 6 about a vertical axis of rotation 39 with respect to the middle part 5 and to the lower part 4. The weighing mechanism WM comprises a settable spring AS which is designed as a pneumatic spring 204. The upper part 6 comprises a carrier 76 which is composed of two mirror-symmetrically designed carrying arms 76a, only one of the carrying arms 76a being visible in the illustration of Figure 10a. As regards the basic design, reference is made once again to Figure 7c which shows a chair in which the carrying arm is of comparable design. Of the movement converter 41, three Bowden cables 234a, 234b and 234c can be seen in Figure 10a. Furthermore, the movement converter 41 comprises a coupling 235, by means of which the Bowden cables 234a, 234b and 234c are decoupled from a rotation of the upper part 6 with respect to the middle part 5. The coupling 235 is designed as a rotor system RS.

[0042] Figure 10b shows an enlarged and slightly perspective illustration of the chair 3 shown in Figure 10a, in the region of the carrying arm 76a of the upper part 6. The carrying arm 76a consists of an upper leg 236 and of a lower leg 237. The two legs 236, 237 are connected rigidly to one another. The carrying arm 76a is fastened with a free end 238 of the lower leg 237 to a pressure tube 205 of the pneumatic spring 204. Tension-mounted as a spring element 20 in the upper leg 236 of the carrier 76a is a leaf spring 21 on which the lower leg 77b of the carrier 77 is supported with an adaptor 239.

[0043] Figure 10c shows a perspective view of the adaptor 239 of the lower leg 77b, the middle part 5 and all the components lying between these. For the sake of clarity, once again, of the upper part 6 with the carrying arm 76a, only one of the carrying arms is illustrated. When the upper part 6 is loaded via the seat, not illustrated, the upper part 6, together with the pneumatic spring 204, is compressed with respect to the middle part 5. The rotor system RS comprises a lower ring 242, an upper ring 243 and an inner ring 243a. These are arranged on the pressure tube 205 of the pneumatic spring 204. The lower ring 242 is mounted on the pressure tube 205 rotatably about the longitudinal axis 39 of the latter and forms a counterbearing 244 for the hoses 241a and 241b of the Bowden cables 234a and 234b. The middle part 5 is designed as a housing 200 and forms a further counterbearing 246 for the hoses 241a and 241b of the Bowden cables 234a and 234b. The upper ring 243 is mounted on the pressure tube 205 rotatably about the longitudinal axis 39 of the latter and vertically displaceably in the direction of the longitudinal axis 39 or in the directions of the arrows y' and y. The wires 240a and 240b of the lower Bowden cables 234a and 234b are fastened to the upper ring 243. The inner ring 243a is mounted in the upper ring 234 and is freely rotatable about the axis of rotation 39 with respect to the upper ring 234 and with respect to the pressure tube 205. A wire 240c of the upper Bowden cable 241c is fastened to the inner ring 243a. In a comparable way, a wire of a further upper Bowden cable, not illustrated, is fastened in a slit 234b of a tab 243c belonging to the inner ring 243a. This further upper Bowden cable, not illustrated, is connected to the second spring mechanism which is arranged on the second carrier, not illustrated. The movement converter 41 thus connects the weighing mechanism WM to two spring mechanisms SM, each of the two spring mechanisms SM assuming half the supporting of an inclination movement of the seat 7 about the axis of rotation 16. The hose 241c of the upper Bowden cable

234c is supported on the lower leg 237 in the carrier arm 76a. During a rotation of the seat or of the upper part 6 in a direction of rotation v or v' about the axis of rotation 39, the upper Bowden cables 234c rotate together with the pneumatic spring 204 and with the inner ring 243a fastened to the pressure tube 205. Due to the lower Bowden cables 234a and 234b connected to the stationary middle part 5, the rings 242 and 243 are held in their position shown in Figure 10c. During a loading of the seat or of the upper part 6, the wires 240a and 240b are drawn downward in the direction of an arrow y'. These then draw the upper ring 243 onto the lower ring 242. The upper ring 243 takes up the inner ring 234a in the direction of the arrow y'. The wire 240c of the Bowden cable 234c, which connects the inner ring 243a and a first lever 248 of a toggle lever 249, thereby draws the first lever 248 in the direction of a lug 247 counter to the force of a spring 222. The lever 248 is mounted on the upper part rotatably about the axis of rotation 16 of the seat. A second lever 250 of the toggle lever 249 is connected to a support 25 rotatably about an axis of rotation 251. The support 25 is fastened to the second lever 250 via a shaft 252 and is guided in the upper leg 236 of the upper part 6 beneath the leaf spring 21. For this purpose, the upper leg 236 has a long hole 253. The two levers 248 and 250 are connected to one another rotatably about an axis of rotation 255 by means of a pin 254. During the loading of the seat, the support 25 is therefore displaced in the direction of an arrow x'. When the seat is relieved and the upper ring 243 is thereby released by the Bowden cables 234a and 234b, the spring 222 presses the first lever 248 of the toggle lever 249 back again into the position shown in Figure 10c. During this rotational movement of the first lever 248 about the axis of rotation 16, the support 25 is also drawn back in the direction of an arrow x. The upper ring 243 is simultaneously raised again via the wire 240c of the Bowden cable 241c into the position shown in Figure 10c. It can be seen clearly in Figure 10c how the upper leg 236 and the lower leg 237 of the carrying arm 76a are welded to one another by means of a triangular steel plate 256 so as to form a unit. Arranged mirror-symmetrically to a contact surface 257 of the carrying arm 76a is the abovementioned second carrying arm which carries the abovementioned second carrier. A bar 258, only half of which is illustrated, connects the carrying arm 76a to the carrying arm not illustrated. The lower leg, not illustrated in Figure 10c, of the carrier is articulated on the upper part 6 rotatably about the axis of rotation 84 by means of the adaptor 239 and is supported on the leaf spring 21 via a bolt 259. Depending on the design of the seat or of the carriers, the bolt 259 may be installed in the adaptor 239 in four different positions 260a to 260d. As long as the seat is loaded by a person sitting upright, the support 25 is displaceably under the leaf spring 21, without the support 25 touching the leaf spring 21. This is achieved by means of a prestress of the leaf spring 21 which can be set via screws 261a and 261b.

[0044] Figure 10d, then, shows the weighing mechanism WM and the movement converter 41 in a sectional view, a hatching of the parts shown in section having been dispensed with so as to keep the illustration clearer. The weighing mechanism WM comprises the pneumatic spring with a piston rod 207 guided in the pressure tube 205, an axial bearing 208, a cup 262 and a helical spring 38. The cup 262 is supported with a collar 263 on the helical spring 38, and the pneumatic spring 204 stands on the axial bearing 208 in the cup 262, the piston rod 207 of the pneumatic spring 204 penetrating through a bottom 264 of the cup 262, and the axial bearing 208 being fastened to a free end 265 of the piston rod 207. The axial bearing 208 allows a free rotatability of the pneumatic spring 204 and of the upper part 6 fastened to the latter, together with the seat, not illustrated, about the axis of rotation 39. The pneumatic spring 204 is guided rotatably with its pressure tube 205, above the helical spring 38, in a housing 200 formed by the middle part 5. The collar 263 of the cup 262 has two slits 265a and 265b, in which the wires 240a and 240b of the Bowden cables 234a and 234b are suspended.

[0045] The slits 265a and 265b in each case form a device CD for fastening the Bowden cables 234a and 234b of the movement converter 41. By means of abutments 266a and 266b, the middle part 5 forms the counterbearing 246 for the hoses 241a and 241b of the Bowden cables 234a and 234b. A height adjustment of the pneumatic spring 204, in which the piston rod 207 moves further in the pressure tube 205 in the direction of the arrow y or moves further out of the pressure tube 205 in the direction of the arrow y', is compensated by the S-shaped run of the Bowden cables 234a and 234b (see also Figure 10c). During a loading of the seat by a person sitting down on the seat, the pneumatic spring 204 presses the cup 262 via the axial bearing 208 in the direction of the arrow y' counter to the helical spring 38 and at the same is lowered, together with the cup 262, in the direction of the arrow y'. During this lowering movement, the cup 262 tightens the wires 240a and 240b of the Bowden cables 234a and 234b. The upper ring 243 is thereby drawn onto the lower ring 242 and the pull is transmitted to the Bowden cable 234c which is fastened to the inner ring 234a. The Bowden cable 234c then causes a displacement of the support 25 (see Figure 10c). Since the rings 242 and 243 are mounted on the pressure tube 205 of the pneumatic spring 204 rotatably about the axis of rotation 39, they can maintain their position with respect to the middle part 5, even when the seat, the upper part 6 and the pneumatic spring 204 are multiply rotated about the vertical axis of rotation 39 on the axial bearing 208. The rings 242 and 243 thus act as free-running rotors.

[0046] The invention is not restricted to exemplary embodiments illustrated or described. On the contrary, it embraces developments of the invention within the scope of the claims.

List of reference symbols:

[0047]

1	Body support structure, piece of furniture
2	Piece of furniture for sitting on
3	Chair
4	Lower part
5, 5a, 5b	Middle part
6, 6a, 6b	Upper part
7	Seat
8	Foot as lower part
9	Wall holder as lower part
10	Ceiling holder as lower part
11	Swing as lower part
12	Height adjustment device
13	Seat part of 7
14	Back part of 7
15	Axis of rotation between 13 and 14
16	Axis of rotation of 13 on 6
17	Arm on 7 or 14
18	Axis of rotation on 17 or 6
19	Axis of rotation on 17 or 6
20, 20a	First spring element
21, 21a, 21b	Leaf spring as first spring element 20
22, 22a, 22b	Projection on 7 or 13
23, 23a	Free end of 20 or 21 or 21a
24, 24a	Tension end of 20 or 21 or 21a
25, 25a	Support
26	Slide
27	Roller
28, 28A	Guide on 6 or 6a
29	Lower end of 26
30	Inclined plane on 5
31	Arm between 5 and 6
31a, 31b	Arm between 5a and 6a or 5b and 6b
32	Arm between 5 and 6
32a, 32b	Arm between 5a and 6a or 5b and 6b
33, 34	Axis of rotation of 31, 31a, 31b
34 to 36	Axis of rotation of 32, 32a, 32b
37, 37a	Second spring element
38	Helical spring as second spring element
39	Vertical axis of rotation
40, 40a	First and second weight force
41	Movement converter
41, 41b	Right and left movement converter
42	Circular path
43	Drive
44	Output
45	Gear
46	Path on 6
47	Shaft of 25
48	Long hole on 26
49	Tension spring
50	Helical spring as first spring element 20
51	Lever on 6
52	Axis of rotation between 51 and 6
53	Engagement point of 20 on 51
54	Cam on 5
55	Roller on 6
56	Articulated lever on 5
56a	Lower lever of 56
56b	Upper lever of 56
57	Axis of rotation between 56a and 56b
58	Axis of rotation between 25 and 56
59	Elastic element between 13 and 14
60	Bore in 5
61	Column on 6
62	Duct in 6
63	Boom of 6
64	Hydraulic fluid
65	Reservoir in 5
66	Piston on 6
67	Piston surface of 61
68	Magnetorheological fluid
69	Concertina for 68 in 65
70	Concertina for 68 in 62
71	Sensor on 5
72	Reception slit on 6 for 20
73	Bearing body on 21
74	Reception slit on 5 for 20
75	Bogie, base
76	Carrier
76a, 76b	Carrying arm of 76
77	Right carrier of 7
77a, 77b	Upper and lower leg of 77
78	Left carrier of 7
78a, 78b	Upper and lower leg of 78
79	Spoke of 77
80	Spoke of 78
81	Crossmember between 6a and 6b
82	Crossmember between 77 and 78
83a, 83b	Screws between 5a and 76a
84	Axis of rotation of 7 on 6a
85	Middle region of 21a
86	Toothed slide on 6a, output body
86a	Output body
87	Toothed quadrant on 6a, drive body
87a	Drive body
88	Axis of rotation of 87
89	Long hole in 87
90	Pin on 5a
91a	Leaf spring as second spring element
92a	Tension end of 91a
93a	Bolt on 6a
94a	Free end of 91a
95, 96, 97	First, second, third interspace
98	Spring
99	Helical spring
200	Housing
201	Quiver
202	Bore in 4
203	Carrier
204	Pneumatic spring
205	Pressure tube

206	Bore in 203
207	Piston rod of 204
207a	Free end of 207
208	Axial bearing
209	Upper ring of 208
210	Lower ring of 208
211	Collar of 210
212	Bottom of 5
213	Bowden cable
214	Lever
214a	Lower end of 214
214b	Upper end of 214
215	Wire
216	Hose
217	Axis of rotation of 214
218	Long hole
219	Sliding surface on 203
220	Counterbearing on 5
221	Counterbearing on 6
222	Spring between 214 and 203
223	Toggle lever
224	Upper lever of 223
225	Lower lever of 223
226	Joint
227	Axis of rotation
228	Spring element
228a	Spring between 226 and 229
229	Abutment on 6 for 223
230	Blocking mechanism
231	Lever between 6 and 7
232	Lever between 6 and 7
233	Toggle lever
234a	Bowden cable
234b	Bowden cable
234c	Bowden cable
235	Coupling
236	Upper leg of 76a
237	Lower leg of 76a
238	Free end of 237
239	Adaptor on 77b
240a	Wire of 234a
240b	Wire of 234b
240c	Wire of 234c
241a	Hose of 234a
241b	Hose of 234b
241c	Hose of 234c
242	Lower ring
243	Upper ring
243a	Inner ring
243b	Slit in 243c
243c	Tab of 243a
244	Counterbearing formed by 242
245	Counterbearing formed by 243
246	Counterbearing formed by 200
247	Lug
248	First lever of 249
249	Toggle lever
250	Second lever of 249
251	Axis of rotation between 250 and 25
252	Shaft on 25
253	Long hole in 236
254	Pin
255	Axis of rotation between 248 and 250
256	Steel plate between 236 and 237
257	Contact surface of 76a
258	Bar
259	Bolt on 239
260a - 260d	Position of 259 on 239
261a	Screw on 6
261b	Screw on 6
262	Cup in 5
263	Collar of 262
264	Bottom of 262
265a	Slit in 263
265b	Slit in 263
266a	Abutment in 5
266b	Abutment in 5
I	Position of rest or position of 1 (nonloaded)
II	Working position or position of 1 (loaded)
III	Working position or position of 1 (loaded)
A	Operating element
A2	Arm of BF2
AS	Settable spring
B	Cloth covering of 7
BF	Leaf spring
BF2	Leaf spring
C	Base or chassis
CD	Device for fastening of 41
DR	Pressure roller on 6
DN	Pressure nose on 6
D95	Thickness of 95
D96	Thickness of 96
F1, F2	Spacing between 25 and 22 in I and II
GL	Rubber bearing
HK	Horizontal component of a weighing movement
K	Curve on which 25 travels
KF	Contact surface of 25
LA	Left arm of BF
LF	Engaging force
LM	Lever mechanism
L1	Spacing between UG and UG2 in I
L2	Spacing between UG and UG2 in II
M	Torque about 16
N	Slot
N1, N2, N3	Level of 6 in I and II and III
OG	Upper counterbearing in 72
P	Person
P1	Upright sitting posture
P2	Reclined sitting posture
P3	Sitting posture leaning forward
RA	Right arm of BF
RS	Rotor system

R1	Reaction force of SM in I
R2	Reaction force of SM in II
S1, S2, S3	Position of 26 in I and II and III
SM	Spring mechanism
UG	Lower counterbearing in 72
UG2	Second lower counterbearing
V1, V2	displacement distance
VK	Vertical component of a weighing movement
W	Wheel
WM	Weighing mechanism
W1, W2	Weighing distance
v, v'	Direction of rotation about 39
w	Direction of rotation
α	Angle between 224 and 225

Claims

1. A body support structure (1) having a base (C), on which at least one seat (7) is articulated, the seat (7) comprising a seat part (13) and a back part (14), an inclination of the seat (7) about at least one axis of rotation (16) being supported by at least one spring mechanism (SM) acting between the seat (7) and the base (C), the spring mechanism (SM) comprising a lever arm (51) and a support (25), the support (25) being movable out of a position of rest (S1) into different working positions (S2, S3), the support (25) assuming the position of rest (S1) when the seat (7) is nonloaded, the support (25) assuming one of the working positions (S2, S3) as a function of'a weight force (40, 40a) with which a person (P) sitting in an upright sitting posture (P1) loads the seat (7), the support (25) being movable freely of an engaging force (LF), which can be generated by the lever arm (51), between its position of rest (S1) and one of the working positions (S2, S3), as long as the person (P) is sitting on the seat (7) in the upright sitting posture (P1), the support (25) being engaged by the lever arm (51) by means of the engaging force (LF) when the person (P) reclines from his upright sitting posture (P1) against the back part (14) into a rearwardly inclined sitting posture (P2), a reaction force (R2) of the spring mechanism (SM) on the seat (7) being adaptable to the respective weight force (40, 40a) of the person (P) by means of the working position (S2, S3) of the support (25), wherein the lever arm (51) is designed as a spring element (20, 20a), **characterised in that** the lever arm (51) designed as a spring element (20, 20a) is designed as a leaf spring (21, 21a).

2. A body support structure according to claim 1, **characterized in that** the support (25) is designed as a spring element (20, 20a).

3. A body support structure according to claim 2, **characterized in that** the support (25) designed as a spring element (20, 20a) is designed as a helical spring (50).

4. A body support structure according to claim 1, **characterized in that** a torque (M) which is generated about the axis of rotation (16) of the seat (7) by the person (P) sitting in the upright sitting posture (P1) on the seat (7) can be absorbed by means of a prestress of the spring element (20, 20a).

5. A body support structure according to claim 1, **characterized in that** the base (C) comprises at least one lower part (4), one middle part (5, 5a, 5b) and one upper part (6, 6a, 6b), the seat (7) being articulated on the upper part (6, 6a, 6b), the upper part (6, 6a, 6b) being guided upward or downward on the middle part (5, 5a, 5b), the upper part (6, 6a, 6b) being supported on the middle part (5, 5a, 5b) by at least one weighing mechanism (WM), the upper part (6, 6a, 6b) moving with respect to the middle part (5, 5a, 5b), during a first loading of the seat (7) with the first weight force (40), out of a first position (I) into a second position (II), counter to a restoring force of the weighing mechanism (WM), with a first weighing movement over a first weighing distance (W1), the upper part (6, 6a, 6b) moving with respect to the middle part (5, 5a, 5b), during a second loading of the seat (7) with the second weight force (40a), out of the first position (I) into a third position (III), counter to the restoring force of the weighing mechanism (WM), with a second weighing movement over a second weighing distance (W2), this weighing movement of the upper part (6, 6a, 6b) over the weighing distance (W1, W2) being convertible into a traveling movement of the support (25) of the spring mechanism (SM) by means of at least one movement converter (41, 41a, 41b).

6. A body support structure according to claim 5, **characterized in that** a height adjustment device (12) is arranged between the lower part (4) and the middle part (5, 5a, 5b).

7. A body support structure according to claim 5, **characterized in that** a height adjustment device (12) is arranged between the middle part (5, 5a, 5b) and the upper part (6, 6a, 6b).

8. A body support structure according to claim 5, **characterized in that** the weighing mechanism (WM) comprises a spring element (37).

9. A body support structure according to one of the preceding claims, **characterized in that** the weighing mechanism (WM) is formed by the height adjustment device (12).

10. A body support structure according to any one of claims 1 to 6, wherein the body support structure comprises a weighing mechanism (WM) which is formed by a height adjustment device, the height adjustment device comprising a settable spring (AS) with a pressure tube (205) and with a piston rod (207) movable in the pressure tube, an axial bearing (208) and a spring element (37, 37a), **characterized in that** the weighing mechanism (WM) has a device (CD) for fastening a movement converter (41).

11. A body support structure according to claim 10, **characterized in that** the movement converter comprises a Bowden cable (213, 234a, 234b).

12. A body support structure according to claim 1, **characterized in that** the support (25) is movable out of a position of rest (S1) along a curve (K) or along a linear path into the different working positions (S2, S3).

13. A method of using a body support structure comprising:

- providing a base (C), a seat (7) rotatably supported on the base (C), and an adjustable spring mechanism (SM) comprising a lever arm (51) and a support (25) disposed between the base (C) and the seat (7);
- positioning a user on the seat (7) without reclining the seat (7) relative to the base (C);
- adjusting the spring mechanism (SM) in response to the weight of the user freely of an engaging force, which can be generated by the lever arm (51) of the spring mechanism (SM);
- reclining the seat (7) relative to the base (C); and
- engaging the lever arm (51) with the support (25) as the seat (7) reclines relative to the base (C),

wherein the lever arm (51) is designed as a spring element (20, 20a), **characterised in that** the lever arm (51) designed as a spring element (20, 20a) is designed as a leaf spring (21, 21a).

Patentansprüche

1. Körper-Trag-Struktur (1) mit einer Basis (C), an welche wenigstens ein Sitz (7) angelenkt ist, wobei der Sitz (7) einen Sitz-Teil (13) und einen Rücken-Teil (14) umfasst, wobei eine Neigung des Sitzes (7) um wenigstens eine Drehachse (16) durch wenigstens einen Federmechanismus (SM) gehaltert ist, welcher zwischen dem Sitz (7) und der Basis (C) wirkt, wobei der Federmechanismus (SM) einen Hebelarm (51) und eine Halterung (25) umfasst, wobei die Halterung (25) aus einer Ruheposition (S1) in verschiedene Arbeitspositionen (S2, S3) bewegbar ist, wobei die Halterung (25) die Ruheposition (S1) einnimmt, wenn der Sitz (7) nicht belastet ist, wobei die Halterung (25) eine der Arbeitspositionen (S2, S3) als eine Funktion einer Gewichtskraft (40, 40a) annimmt, mit welcher eine in einer aufrechten Sitzhaltung (P1) sitzende Person (P) den Sitz (7) belastet, wobei die Halterung (25) frei von einer Eingriffskraft (LF), welche durch den Hebelarm (51) erzeugt werden kann, zwischen ihrer Ruheposition (S1) und einer der Arbeitspositionen (S2, S3) bewegbar ist, solange die Person (P) auf dem Sitz (7) in der aufrechten Sitzhaltung (P1) sitzt, wobei die Halterung (25) von dem Hebelarm (51) mittels der Eingriffskraft (LF) eingegriffen wird, wenn sich die Person (P) von ihrer aufrechten Sitzhaltung (P1) gegen den Rückenteil (14) in eine rückwärts geneigte Sitzhaltung (P2) lehnt, wobei eine Reaktionskraft (R2) des Federmechanismus (SM) an dem Sitz (7) auf die jeweilige Gewichtskraft (40, 40a) der Person (P) mittels der Arbeitsposition (S2, S3) der Halterung (25) einstellbar ist, wobei der Hebelarm (51) als ein Federelement (20, 20a) ausgelegt ist, **dadurch gekennzeichnet, dass** der Hebelarm (51), welcher als ein Federelement (20, 20a) ausgelegt ist, als eine Blattfeder (21, 21 a) ausgelegt ist.

2. Körper-Trag-Struktur nach Anspruch 1, **dadurch gekennzeichnet, dass** die Halterung (25) als ein Federelement (20, 20a) ausgelegt ist.

3. Körper-Trag-Struktur nach Anspruch 2, **dadurch gekennzeichnet, dass** die Halterung (25), welche als ein Federelement (20, 20a) ausgelegt ist, als eine Schraubenfeder (50) ausgelegt ist.

4. Körper-Trag-Struktur nach Anspruch 1, **dadurch gekennzeichnet, dass** ein Drehmoment (M), welches um die Drehachse (16) des Sitzes (7) durch die Person (P), welche in der aufrechten Sitzhaltung (P1) auf dem Sitz (7) sitzt, erzeugt wird, mittels einer Vorspannung des Federelements (20, 20a) absorbiert werden kann.

5. Körper-Trag-Struktur nach Anspruch 1, **dadurch gekennzeichnet, dass** die Basis (C) wenigstens einen unteren Teil (4), einen mittleren Teil (5, 5a, 5b) und einen oberen Teil (6, 6a, 6b) umfasst, wobei der Sitz (7) an dem oberen Teil (6, 6a, 6b) angelenkt ist, wobei der obere Teil (6, 6a, 6b) an dem mittleren Teil (5, 5a, 5b) nach oben oder nach unten geführt ist, wobei der obere Teil (6, 6a, 6b) an dem mittleren Teil (5, 5a, 5b) durch wenigstens einen Wiege-Mechanismus (WM) gehaltert ist, wobei sich der obere Teil (6, 6a, 6b) in Bezug auf den mittleren Teil (5, 5a, 5b), während eines ersten Belastens des Sitzes (7) mit der ersten Gewichtskraft (40), aus einer ersten

Position (I) in eine zweite Position (II), gegen eine Wiederherstellungskraft des Wiege-Mechanismus (WM), mit einer ersten Wiege-Bewegung über eine erste Wiege-Distanz (W1), bewegt, wobei sich der obere Teil (6, 6a, 6b) in Bezug auf den mittleren Teil (5, 5a, 5b), während eines zweiten Belastens des Sitzes (7) mit der zweiten Gewichtskraft (40a), aus der ersten Position (I) in eine dritte Position (III), gegen die Wiederherstellungskraft des Wiege-Mechanismus (WM), mit einer zweiten Wiege-Bewegung über eine zweite Wiege-Distanz (W2), bewegt, wobei diese Wiege-Bewegung des oberen Teils (6, 6a, 6b) über die Wiege-Distanz (W1, W2) in eine Fahrbewegung der Halterung (25) des Federmechanismus (SM) mittels wenigstens eines Bewegungs-Umwandlers (41, 41 a, 41 b) umwandelbar ist.

6. Körper-Trag-Struktur nach Anspruch 5, **dadurch gekennzeichnet, dass** eine Höhen-Einstell-Vorrichtung (12) zwischen dem unteren Teil (4) und dem mittleren Teil (5, 5a, 5b) angeordnet ist.

7. Körper-Trag-Struktur nach Anspruch 5, **dadurch gekennzeichnet, dass** eine Höhen-Einstell-Vorrichtung (12) zwischen dem mittleren Teil (5, 5a, 5b) und dem oberen Teil (6, 6a, 6b) angeordnet ist.

8. Körper-Trag-Struktur nach Anspruch 5, **dadurch gekennzeichnet, dass** der Wiege-Mechanismus (WM) ein Federelement (37) umfasst.

9. Körper-Trag-Struktur nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Wiege-Mechanismus (WM) durch die Höhen-Einstell-Vorrichtung (12) gebildet ist.

10. Körper-Trag-Struktur nach einem der Ansprüche 1 bis 6, wobei die Körper-Trag-Struktur einen Wiege-Mechanismus (WM) umfasst, welcher durch eine Höhen-Einstell-Vorrichtung gebildet ist, wobei die Höhen-Einstell-Vorrichtung eine setzbare Feder (AS) mit einer Druckröhre (205) und mit einem Kolben-Stab (207), welcher in der Druckröhre bewegbar ist, eine Axiallagerung (208) und ein Federelement (37, 37a) umfasst, **dadurch gekennzeichnet, dass** der Wiege-Mechanismus (WM) eine Vorrichtung (CD) zum Befestigen eines Bewegungs-Umwandlers (41) aufweist.

11. Körper-Trag-Struktur nach Anspruch 10, **dadurch gekennzeichnet, dass** der Bewegungs-Umwandler ein Bowden-Kabel (213, 234a, 234b) umfasst.

12. Körper-Trag-Struktur nach Anspruch 1, **dadurch gekennzeichnet, dass** die Halterung (25) aus einer Ruheposition (S1) entlang einer Kurve (K) oder entlang eines linearen Weges in die unterschiedlichen Arbeitspositionen (S2, S3) bewegbar ist.

13. Verfahren zum Verwenden einer Körper-Trag-Struktur, umfassend:

- Bereitstellen einer Basis (C), eines Sitzes (7), welcher drehbar an der Basis (C) gehaltert ist, und eines einstellbaren Federmechanismus (SM), umfassend einen Hebelarm (51) und eine Halterung (25), welche zwischen der Basis (C) und dem Sitz (7) angeordnet ist;
- Positionieren eines Benutzers auf dem Sitz (7) ohne den Sitz (7) relativ zu der Basis (C) zurück zu lehnen;
- Einstellen des Federmechanismus (SM) in Reaktion auf das Gewicht des Benutzers, frei von einer Eingriffskraft, welche durch den Hebelarm (51) des Federmechanismus (SM) erzeugt werden kann;
- Zurücklehnen des Sitzes (7) relativ zu der Basis (C); und
- Eingreifen des Hebelarms (51) mit der Halterung (25), wenn sich der Sitz (7) relativ zu der Basis (C) zurücklehnt, wobei der Hebelarm (51) als ein Federelement (20, 20a) ausgelegt ist, **dadurch gekennzeichnet, dass** der Hebelarm (51), welcher als ein Federelement (20, 20a) ausgelegt ist, als eine Blattfeder (21, 21 a) ausgelegt ist.

Revendications

1. Structure de support de corps (1) ayant une base (C), sur laquelle au moins un siège (7) est articulé, le siège (7) comprenant une partie siège (13) et une partie dossier (14), une inclinaison du siège (7) autour d'au moins un axe de rotation (16) étant supporté par au moins un mécanisme à ressort (SM) agissant entre le siège (7) et la base (C), le mécanisme à ressort (SM) comprenant un bras de levier (51) et un support (25), le support (25) pouvant se déplacer hors d'une position de repos (S1) vers différentes positions de travail (S2, S3), le support (25) occupant la position de repos (S1) lorsque le siège (7) est vide, le support (25) occupant l'une des positions de travail (S2, S3) en fonction d'une force de poids (40, 40a) avec laquelle une personne (P) assise dans une position assise droite (P1) occupe le siège (7), le support (25) pouvant se déplacer librement sans l'effet d'une force de mise en prise (LF), qui peut être générée par le bras de levier (51), entre sa position de repos (S1) et l'une des positions de travail (S2, S3), aussi longtemps que la personne (P) est assise sur le siège (7) dans la position assise droite (P1), le support (25) étant mis en prise par le bras de levier (51) au moyen de la force de mise en prise (LF) lorsque la personne (P) s'incline de sa position assise droite (P1) contre la partie dossier (14) vers une position assise inclinée vers l'arrière

(P2), une force de réaction (R2) du mécanisme à ressort (SM) sur le siège (7) étant adaptable à la force de poids respective (40, 40a) de la personne (P) au moyen de la position de travail (S2, S3) du support (25), où le bras de levier (51) est conçu comme un élément ressort (20, 20a), **caractérisée en ce que** le bras de levier (51) conçu comme un élément ressort (20, 20a) est conçu comme un ressort à lames (21, 21a).

2. Structure de support de corps selon la revendication 1, **caractérisée en ce que** le support (25) est conçu comme un élément ressort (20, 20a).

3. Structure de support de corps selon la revendication 2, **caractérisée en ce que** le support (25) conçu comme un élément ressort (20, 20a) est conçu comme un ressort hélicoïdal (50).

4. Structure de support de corps selon la revendication 1, **caractérisée en ce qu'**un couple (M) qui est généré autour de l'axe de rotation (16) du siège (7) par la personne (P) assise dans la position assise droite (P1) sur le siège (7) peut être absorbé au moyen d'une précontrainte de l'élément ressort (20, 20a).

5. Structure de support de corps selon la revendication 1, **caractérisée en ce que** la base (C) comprend au moins une partie inférieure (4), une partie médiane (5, 5a, 5b) et une partie supérieure (6, 6a, 6b), le siège (7) étant articulé sur la partie supérieure (6, 6a, 6b), la partie supérieure (6, 6a, 6b) étant guidée vers le haut ou vers le bas sur la partie médiane (5, 5a, 5b), la partie supérieure (6, 6a, 6b) étant supportée sur la partie médiane (5, 5a, 5b) par au moins un mécanisme de pesage (WM), la partie supérieure (6, 6a, 6b) se déplaçant par rapport à la partie médiane (5, 5a, 5b), au cours d'une première occupation du siège (7) avec la première force de poids (40), hors d'une première position (I) vers une deuxième position (II), à l'encontre d'une force de rappel du mécanisme de pesage (WM), avec un premier mouvement de pesage au-dessus d'une première distance de pesage (W1), la partie supérieure (6, 6a, 6b) se déplaçant par rapport à la partie médiane (5, 5a, 5b), au cours d'une deuxième occupation du siège (7) avec la deuxième force de poids (40a), hors de la première position (I) vers une troisième position (III), à l'encontre de la force de rappel du mécanisme de pesage (WM), avec un deuxième mouvement de pesage au-dessus d'une deuxième distance de pesage (W2), ce mouvement de pesage de la partie supérieure (6, 6a, 6b) au-dessus de la distance de pesage (W1, W2) étant convertible en un mouvement de déplacement du support (25) du mécanisme à ressort (SM) au moyen d'au moins un convertisseur de mouvement (41, 41a, 41b).

6. Structure de support de corps selon la revendication 5, **caractérisée en ce qu'**un dispositif de réglage de la hauteur (12) est agencé entre la partie inférieure (4) et la partie médiane (5, 5a, 5b).

7. Structure de support de corps selon la revendication 5, **caractérisée en ce qu'**un dispositif de réglage de la hauteur (12) est agencé entre la partie médiane (5, 5a, 5b) et la partie supérieure (6, 6a, 6b).

8. Structure de support de corps selon la revendication 5, **caractérisée en ce que** le mécanisme de pesage (WM) comprend un élément ressort (37).

9. Structure de support du corps selon l'une des revendications précédentes, **caractérisée en ce que** le mécanisme de pesage (WM) est formé par le dispositif de réglage de la hauteur (12).

10. Structure de support de corps selon l'une quelconque des revendications 1 à 6, dans laquelle la structure de support de corps comprend un mécanisme de pesage (WM) qui est formé par un dispositif de réglage de la hauteur, le dispositif de réglage de la hauteur comprenant un ressort réglable (AS) avec une conduite de pression (205) et avec une tige de piston (207) pouvant se déplacer dans la conduite de pression, un palier axial (208) et un élément ressort (37, 37a), **caractérisée en ce que** le mécanisme de pesage (WM) a un dispositif (CD) pour la fixation d'un convertisseur de mouvement (41).

11. Structure de support de corps selon la revendication 10, **caractérisée en ce que** le convertisseur de mouvement comprend un câble Bowden (213, 234a, 234b).

12. Structure de support de corps selon la revendication 1, **caractérisée en ce que** le support (25) peut se déplacer hors d'une position de repos (S) le long d'une courbe (K) ou le long d'un trajet linéaire vers les différentes positions de travail (S2, S3).

13. Procédé d'utilisation d'une structure de support de corps comprenant le fait :

- de fournir une base (C), un siège (7) supporté en rotation sur la base (C), et un mécanisme à ressort ajustable (SM) comprenant un bras de levier (51) et un support (25) disposés entre la base (C) et le siège (7) ;
- de positionner un utilisateur sur le siège (7) sans incliner le siège (7) par rapport à la base (C) ;
- d'ajuster le mécanisme à ressort (SM) en réponse au poids de l'utilisateur librement sans l'effet d'une force de mise en prise, qui peut être générée par le bras de levier (51) du mécanisme

à ressort (SM) ;
- d'incliner le siège (7) par rapport à la base (C) ; et
- de mettre en prise le bras de levier (51) avec le support (25) à mesure que le siège (7) s'incline par rapport à la base (C),

où le bras de levier (51) est conçu comme un élément ressort (20, 20a), **caractérisé en ce que** le bras de levier (51) conçu comme un élément ressort (20, 20a) est conçu comme un ressort à lames (21, 21a).

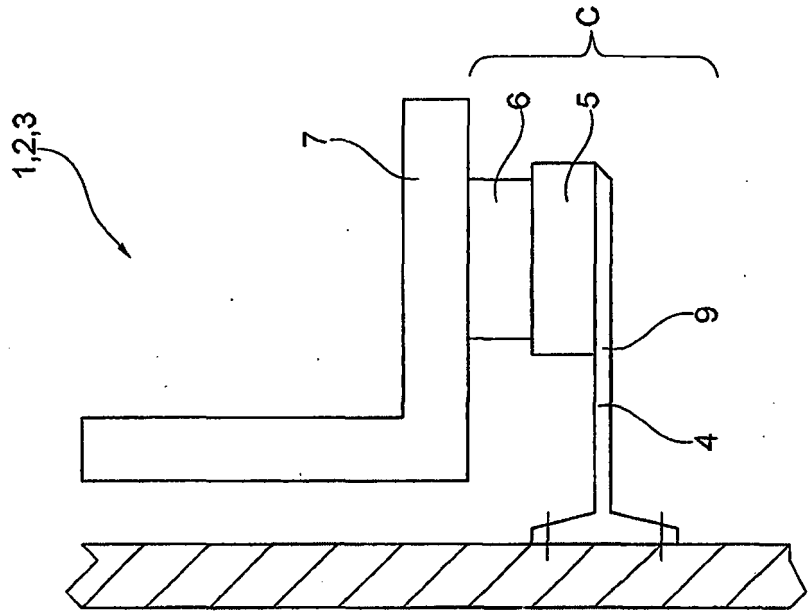

Fig. 1b

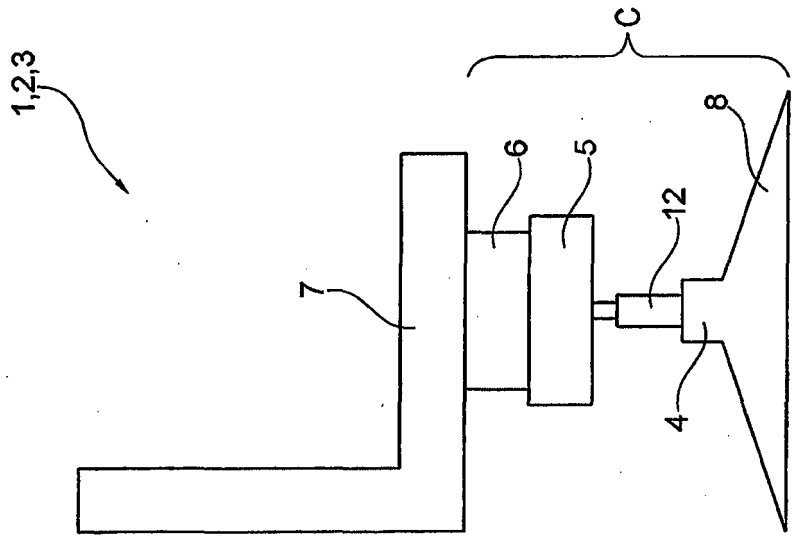

Fig. 1a

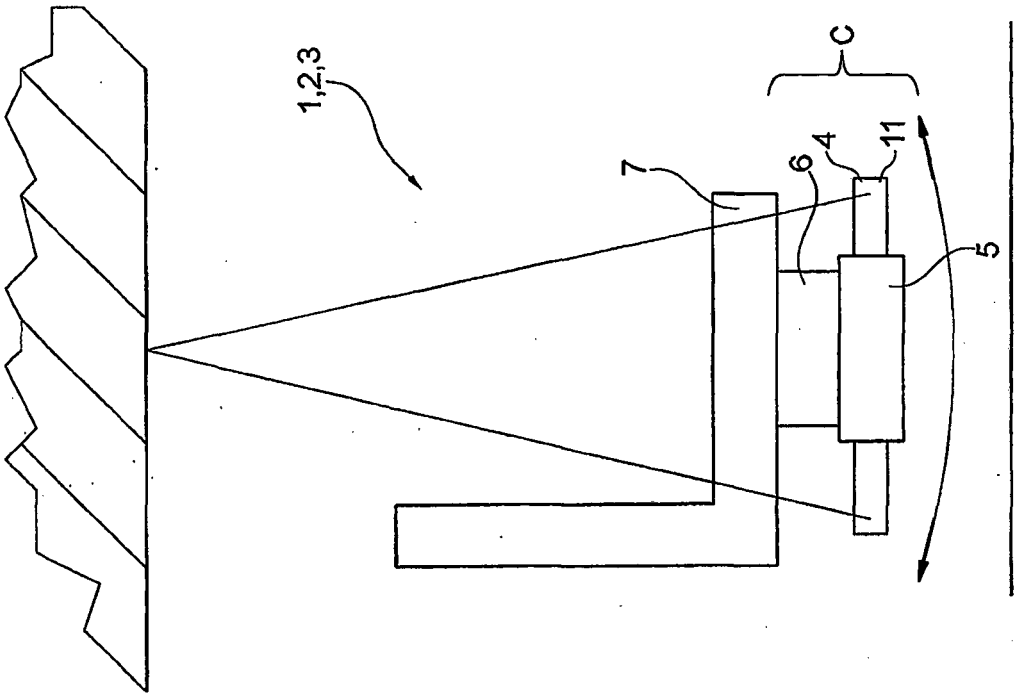

Fig. 1d

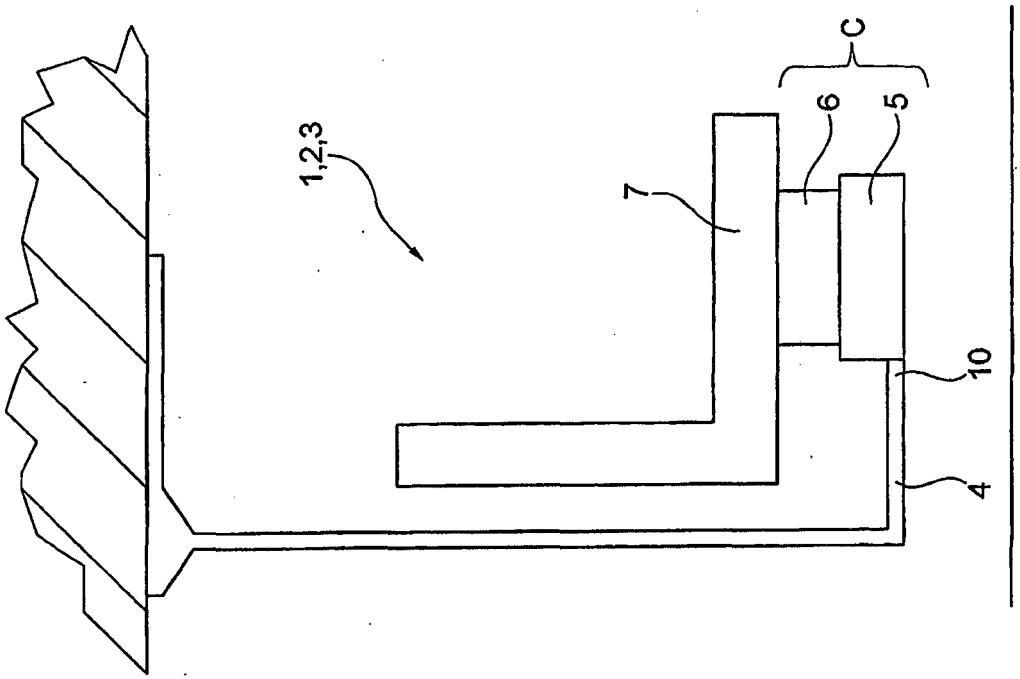

Fig. 1c

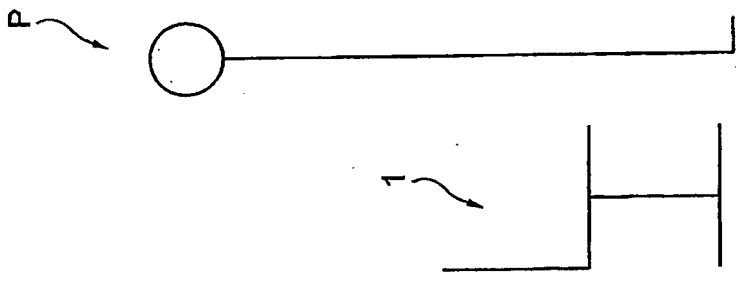

Fig. 1e

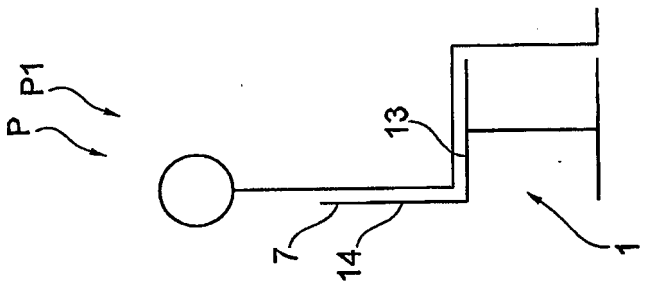

Fig. 1f

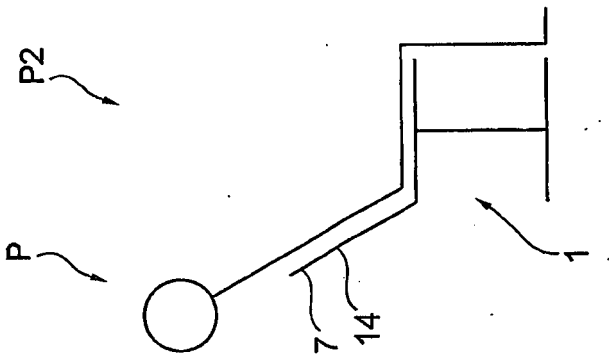

Fig. 1g

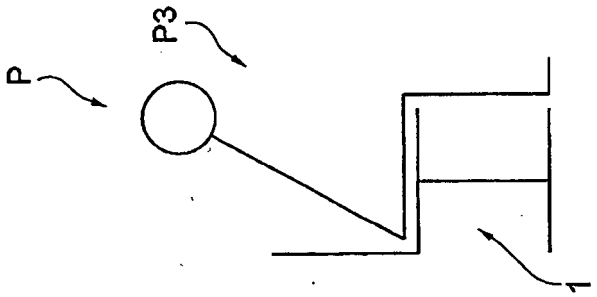

Fig. 1h

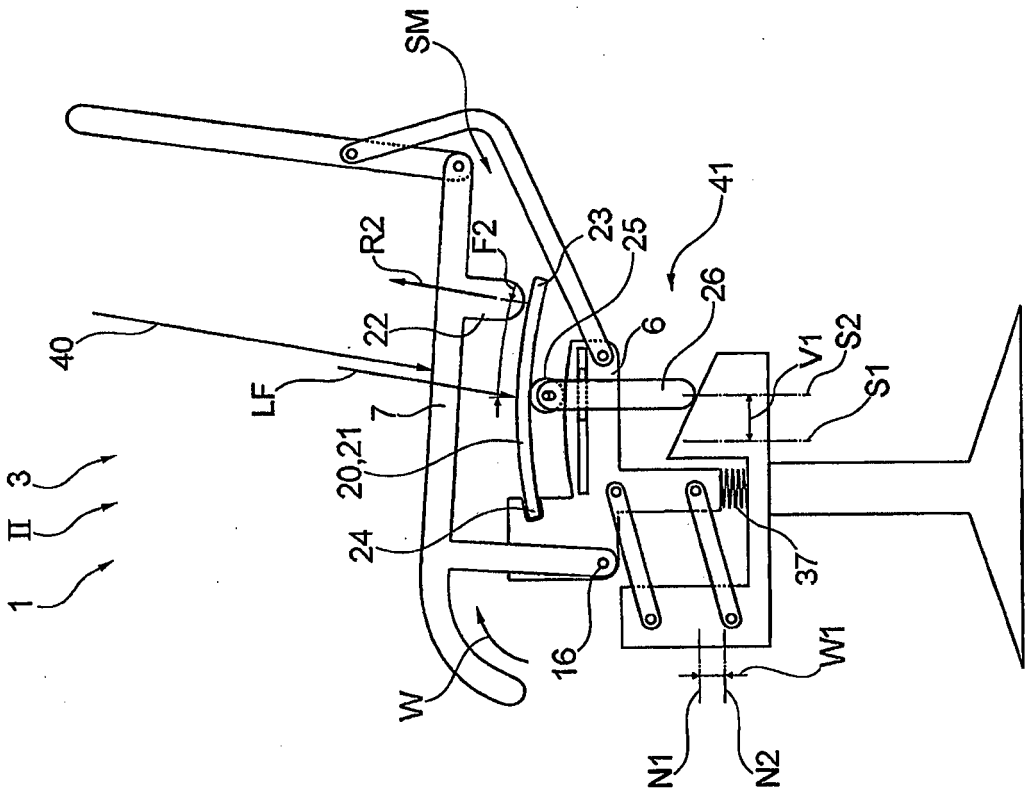
SM
R2
F2
23
25
41
26
40
22
6
V1
S2
S1
LF
7
20,21
3
II
1
24
37
16
W1
W
N1
N2

Fig. 2b

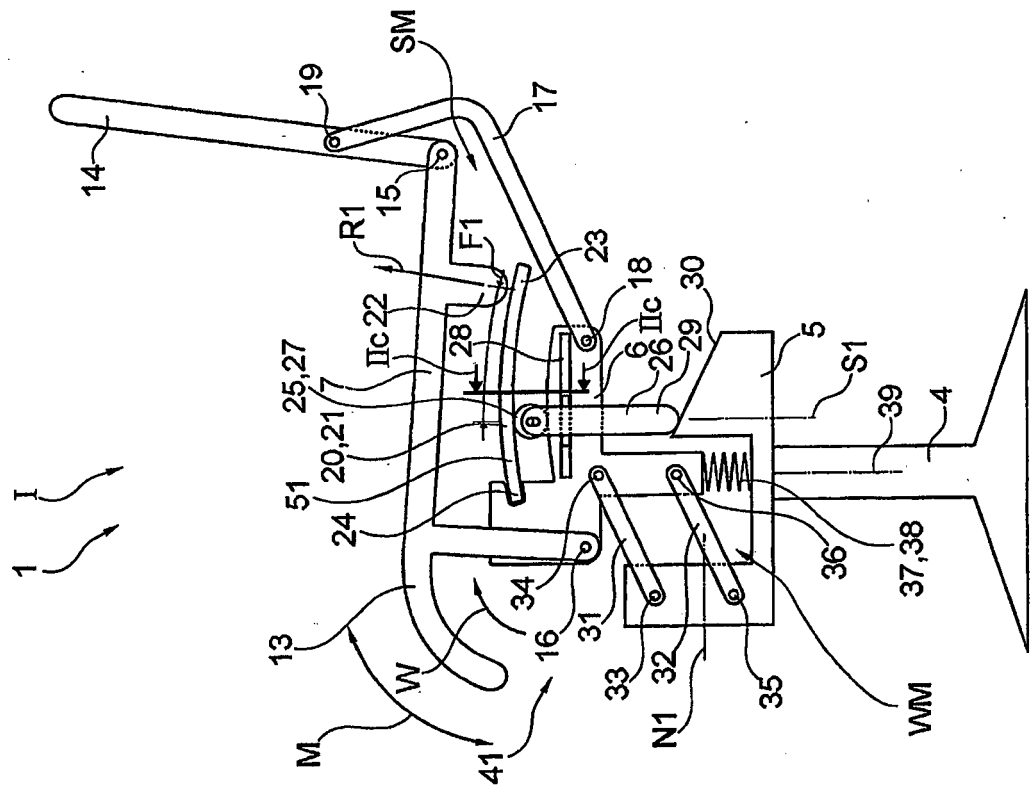
SM
19
17
14
15
R1
F1
23
18
IIc
30
IIc 22
28
6
26
29
5
S1
25,27
7
20,21
39
4
I
1
51
24
36
37,38
34
16
31
13
W
33
32
35
WM
M
41
N1

Fig. 2a

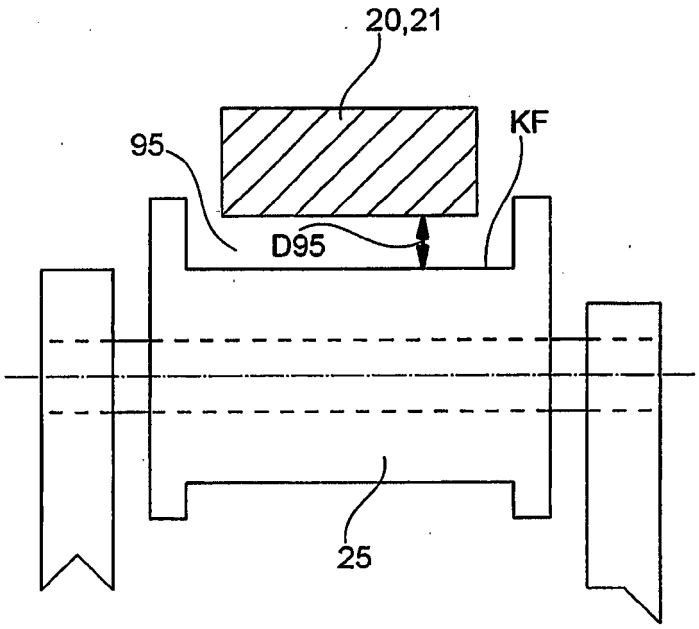

Fig. 2c

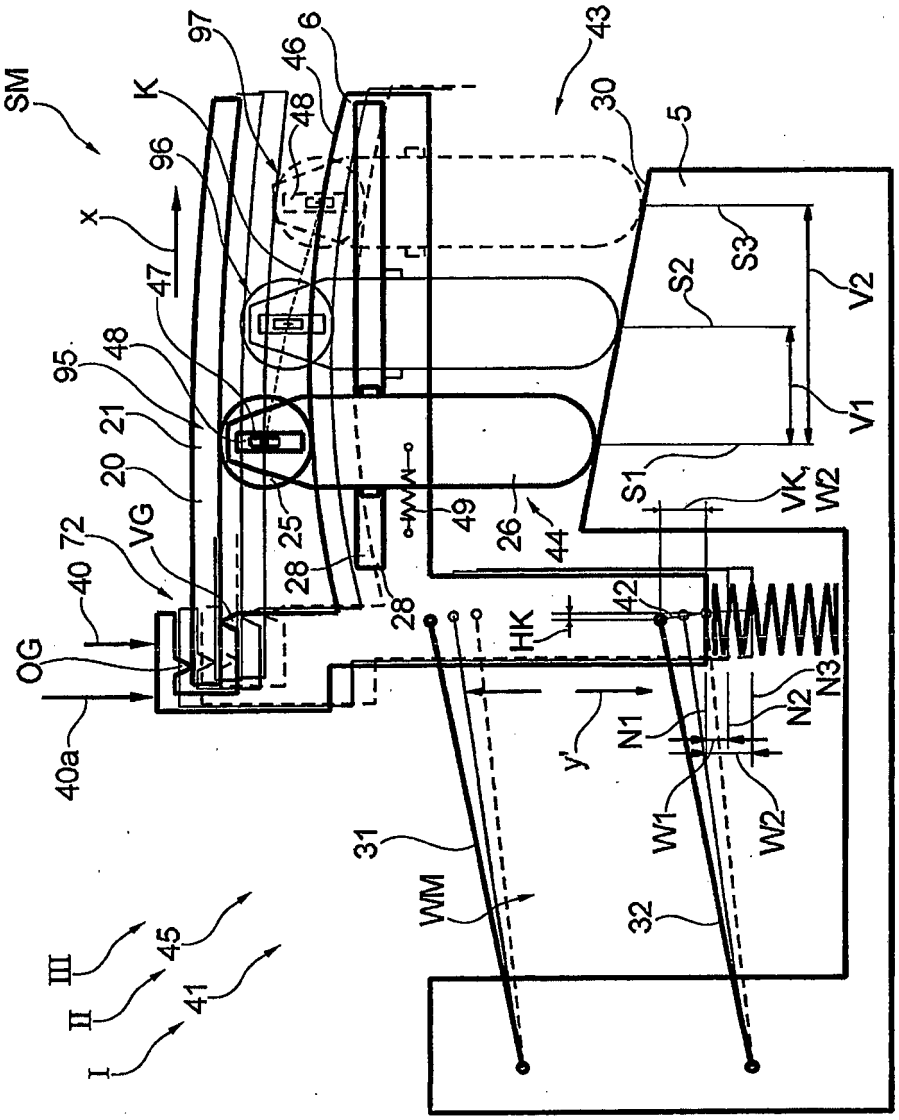
SM
K
97
46
6
43
30
5
96
x
47
48
95
21
20
72
VG
40
OG
40a
25
28
49
26
44
42
HK
S1
S2
S3
V2
V1
Vk,
W2
N1
N2
N3
y'
W1
W2
31
WM
32
III
II
I
45
41

Fig. 3

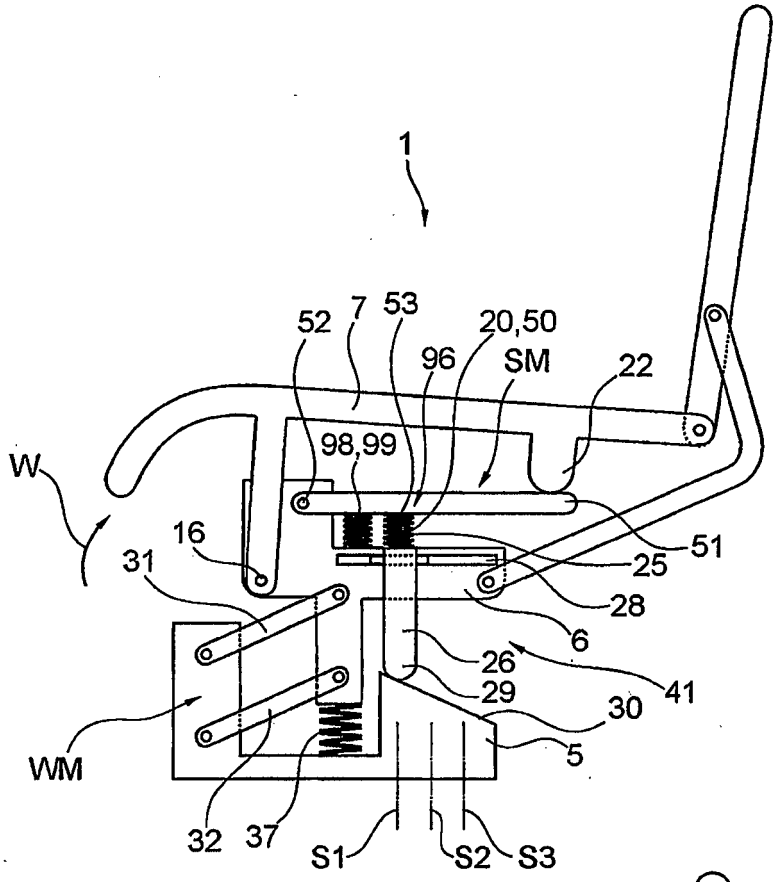
1
52
7
53
20,50
96
SM
22
98,99
W
16
31
25
51
28
6
26
41
29
30
5
WM
32
37
S1
S2
S3

Fig. 4a

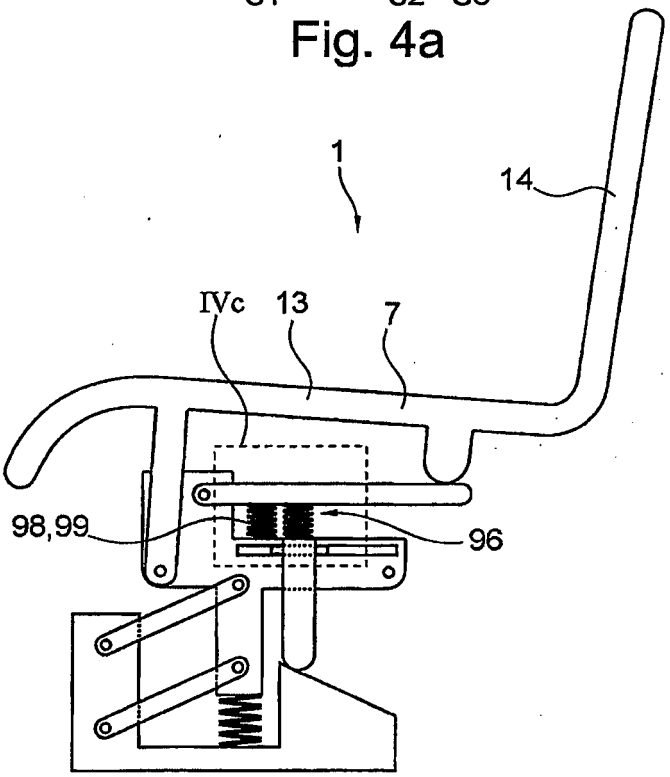
1
14
IVc
13
7
98,99
96

Fig. 4b

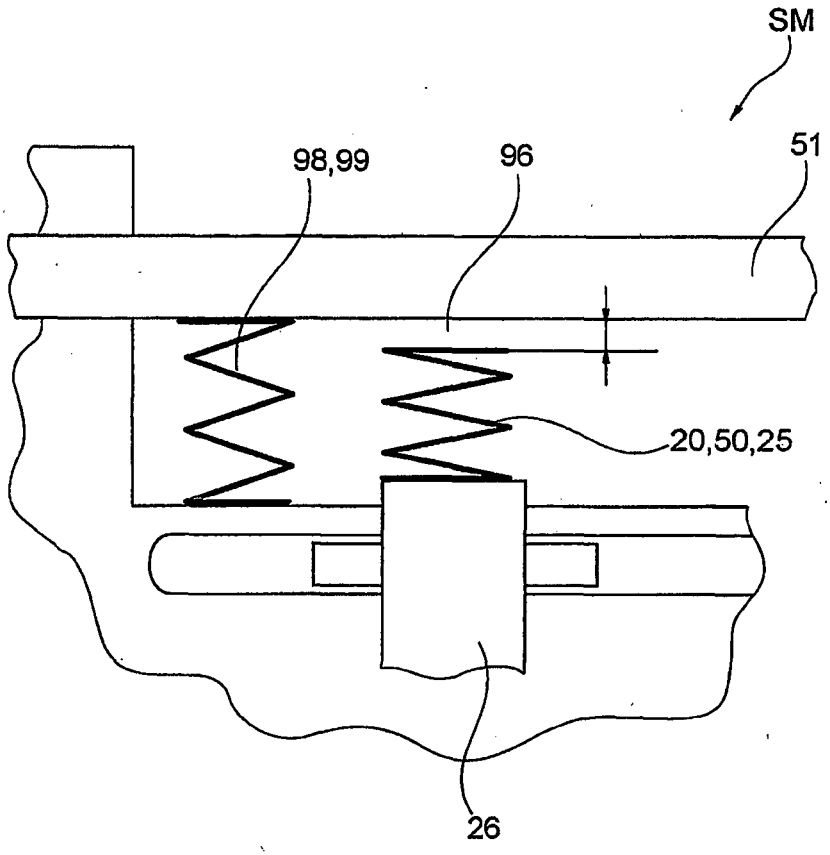

Fig. 4c

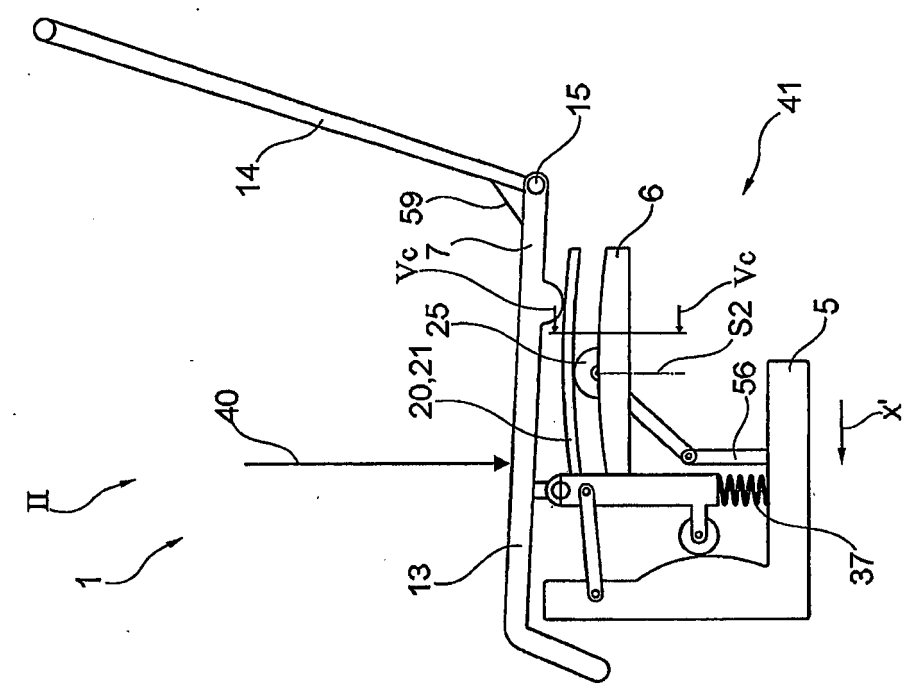
II
1
40
13
14
15
59
Vc
7
25
20,21
6
41
Vc
S2
5
56
37
X'

Fig. 5b

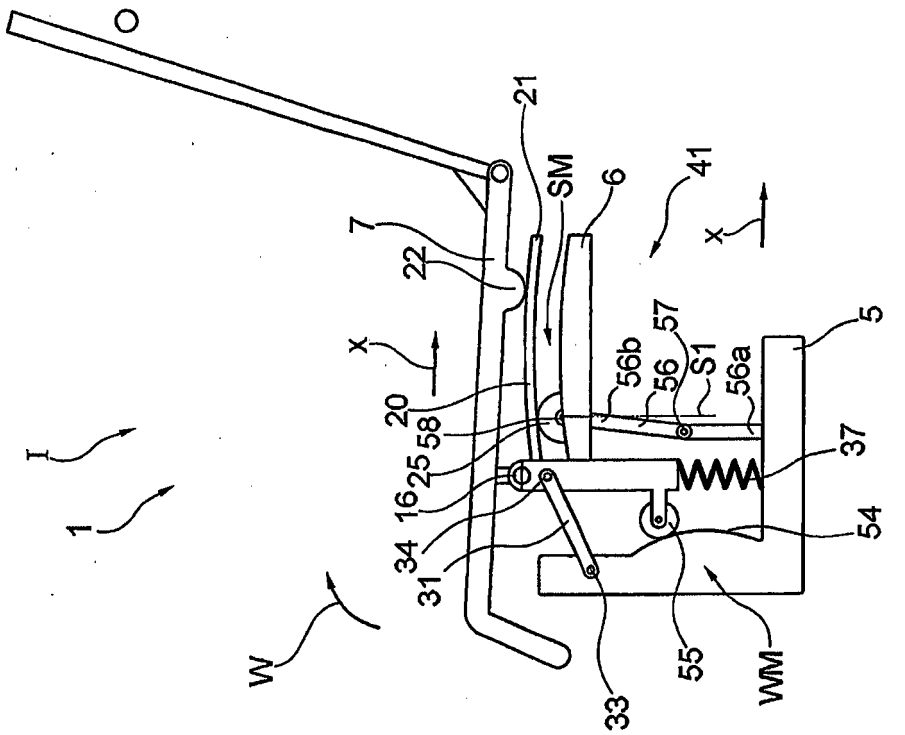
I
1
W
O
21
SM
6
41
7
22
X
20
58
25
16
34
31
33
55
WM
54
37
56b
56
57
S1
56a
5

Fig. 5a

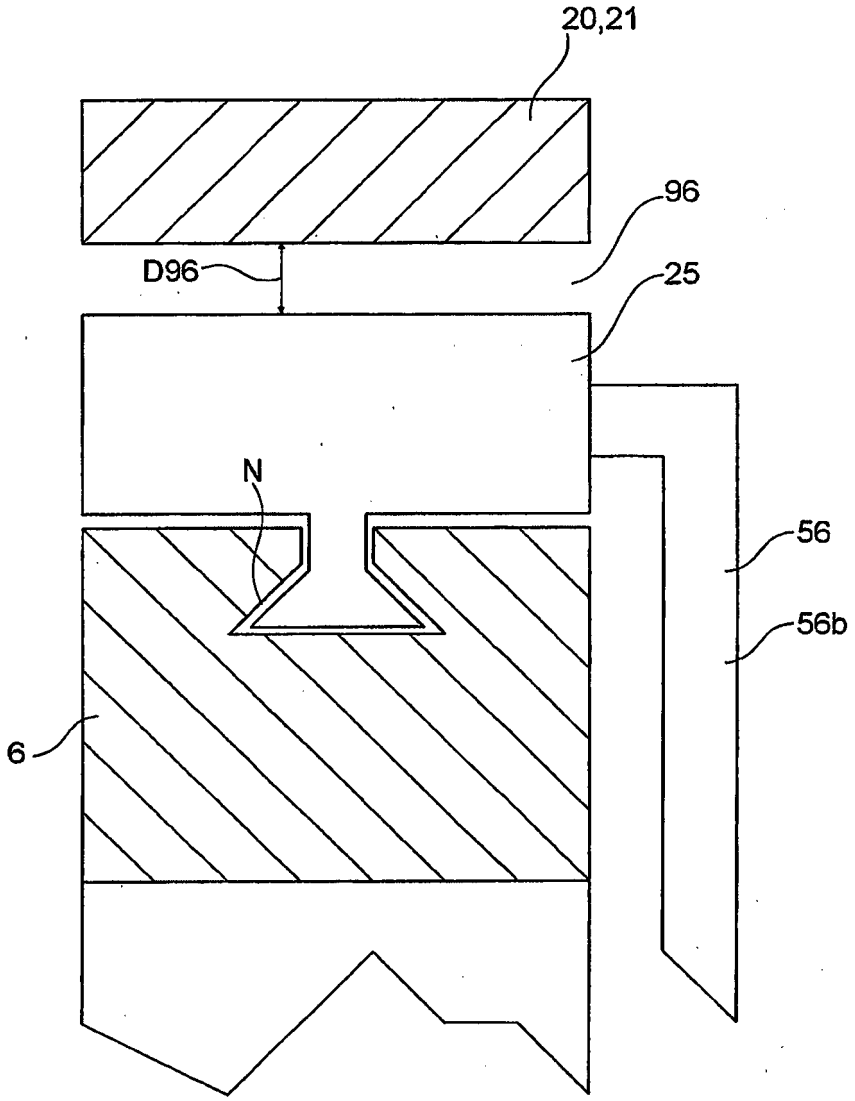

Fig. 5c

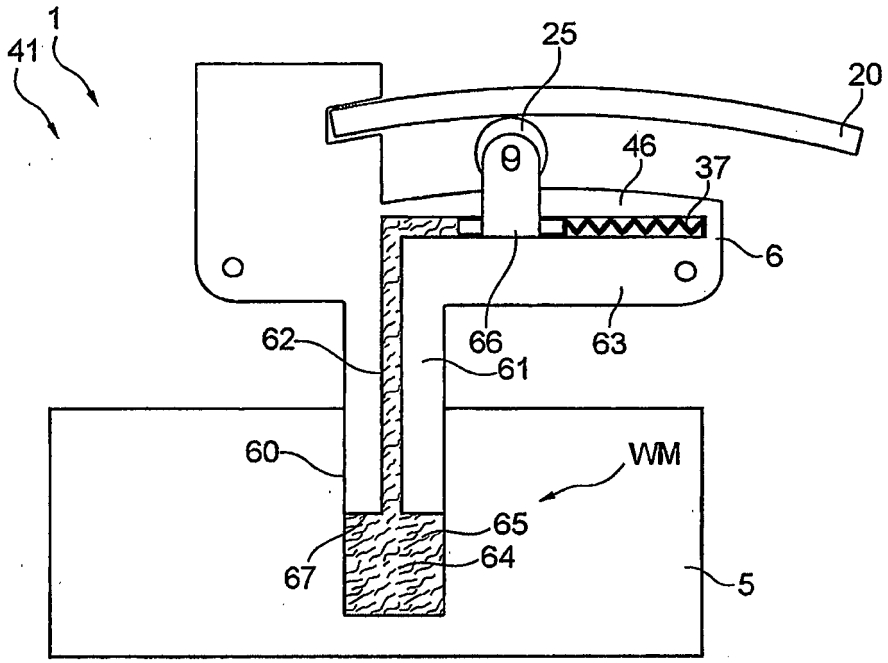
1
41
25
20
46
37
6
62
66
63
61
60
WM
65
67
64
5

Fig. 6a

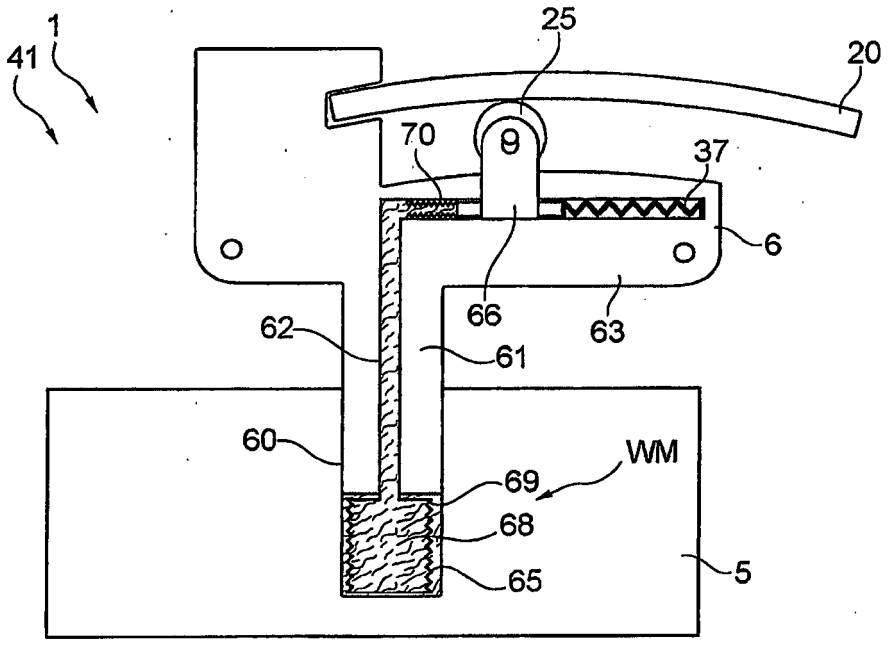
1
41
25
20
70
37
6
66
63
62
61
60
WM
69
68
65
5

Fig. 6b

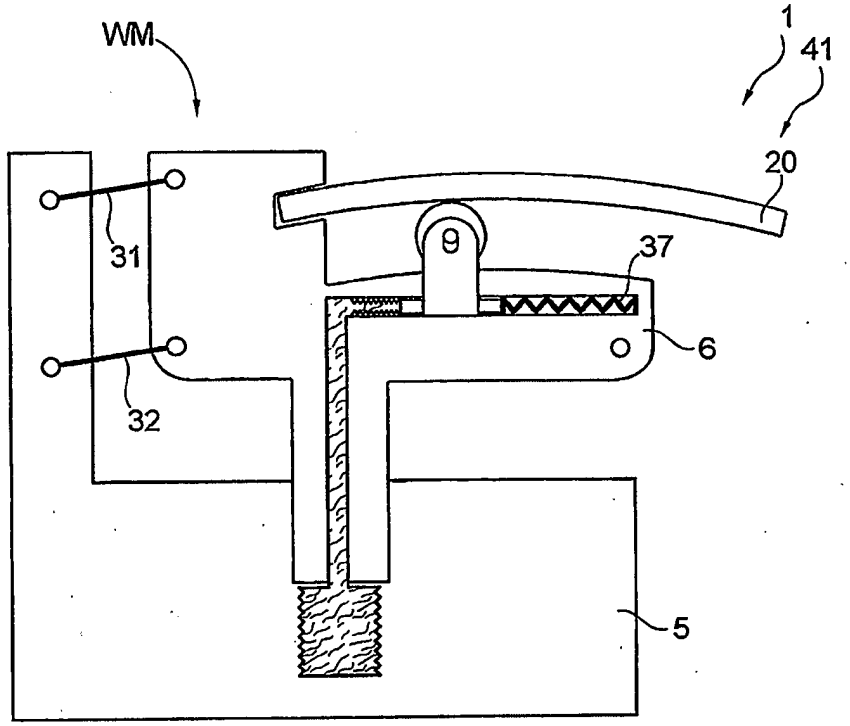

Fig. 6c

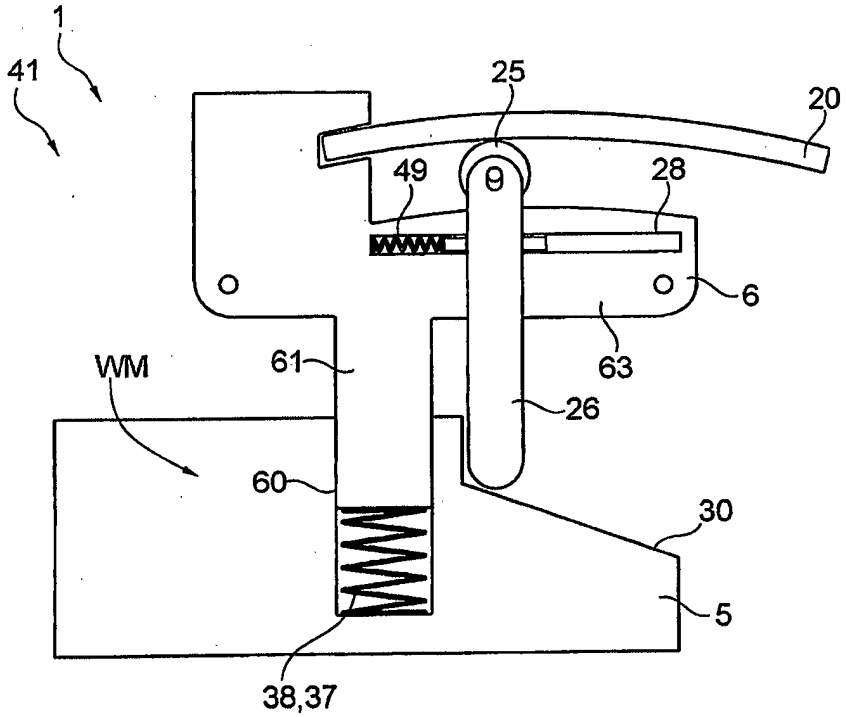

Fig. 6d

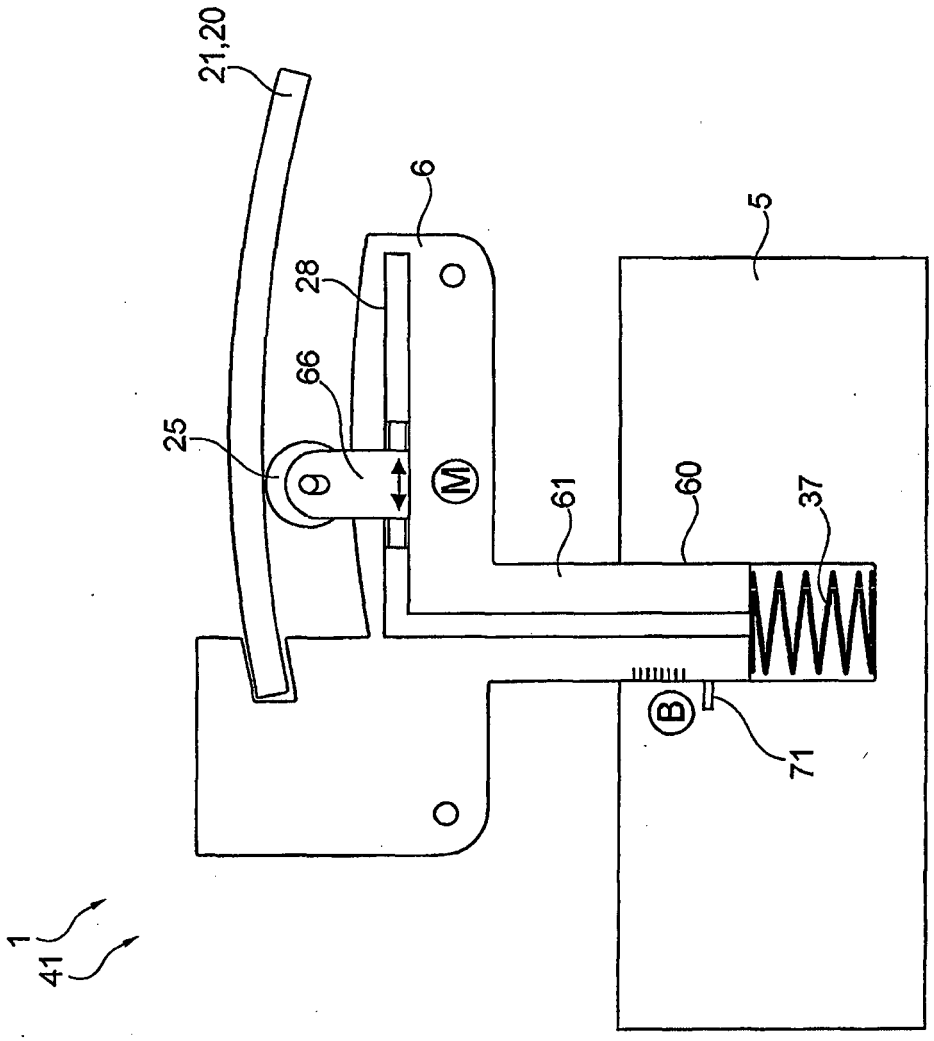

Fig. 6e

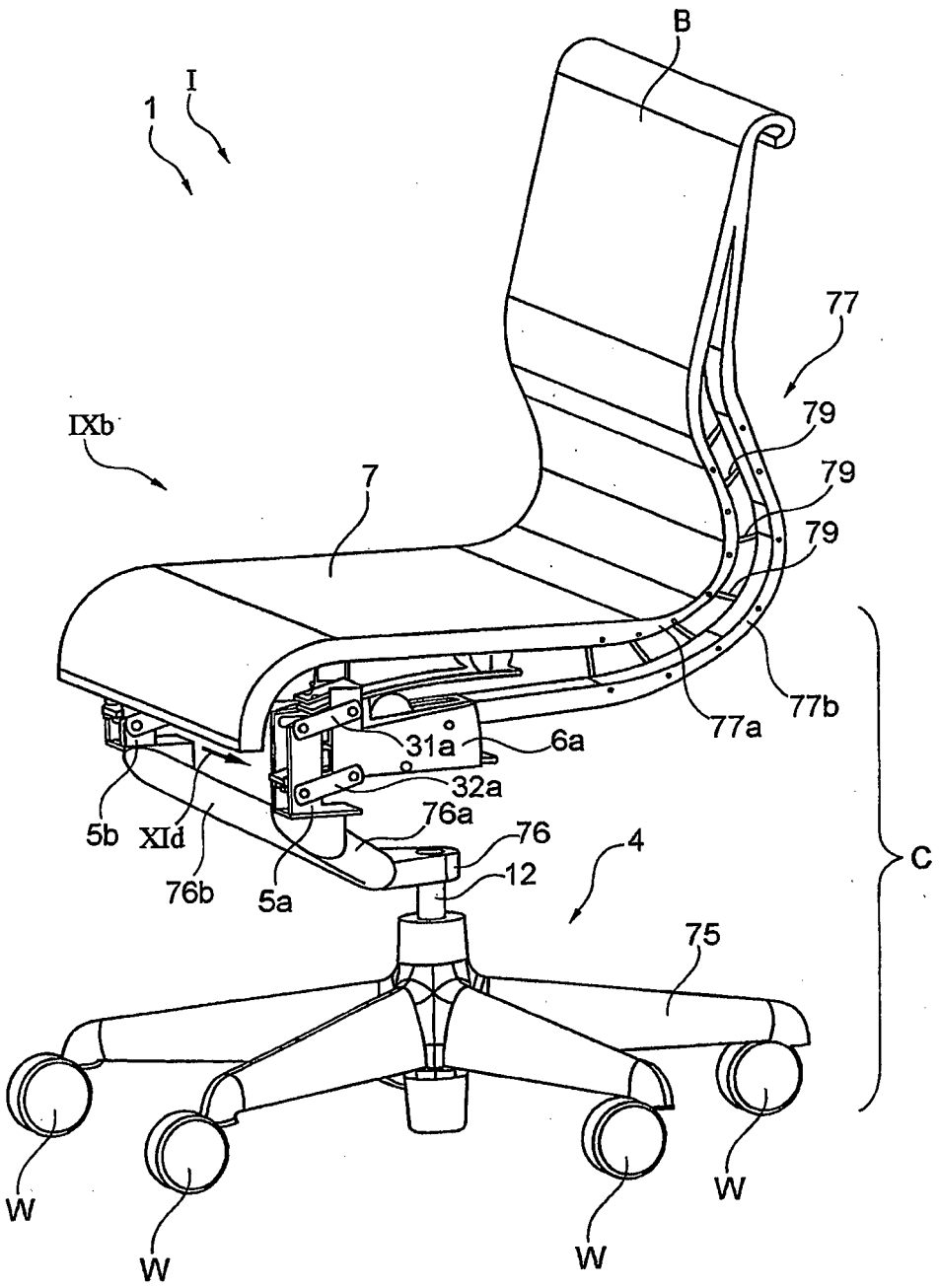
B
I
1
77
79
79
79
IXb
7
77b
77a
31a
6a
32a
76a
5b
XId
76
4
12
76b
5a
C
75
W
W
W
W

Fig. 7a

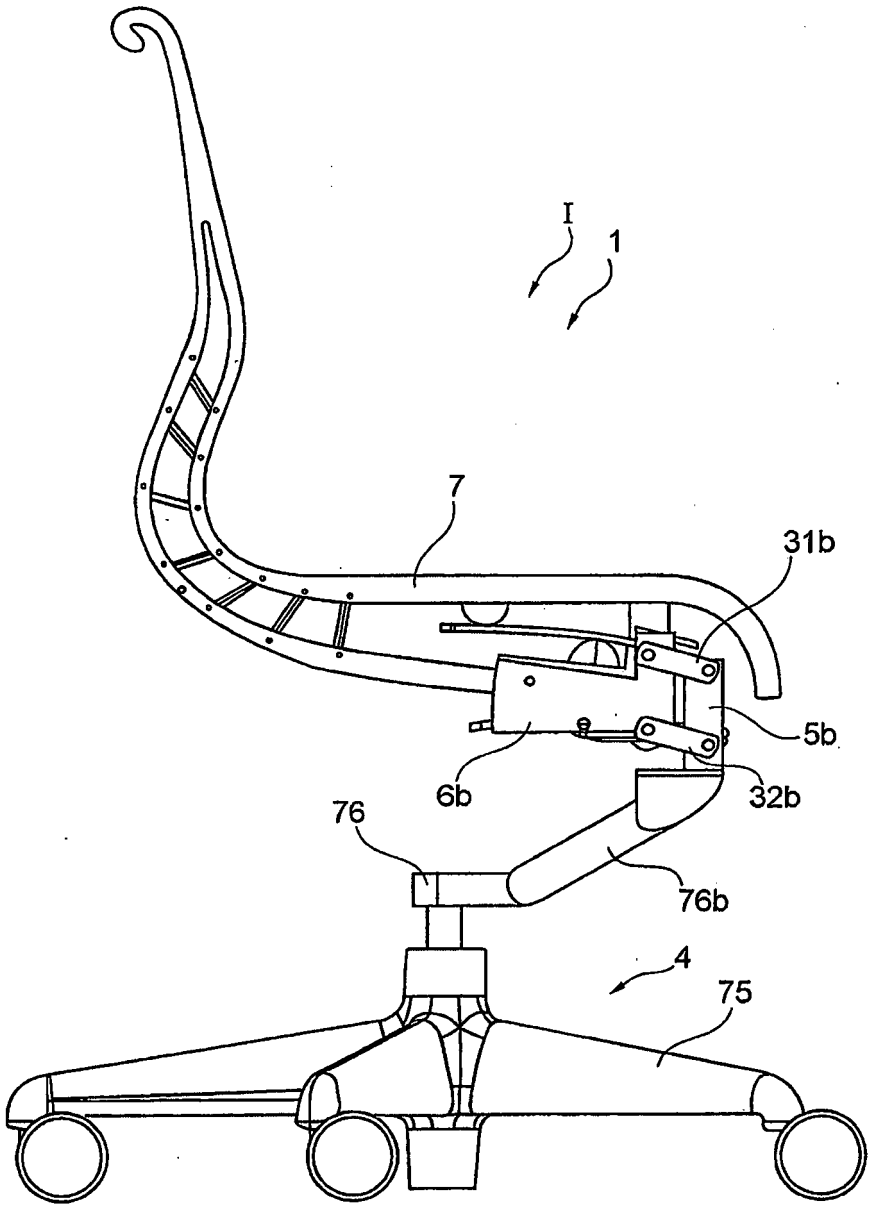

Fig. 7b

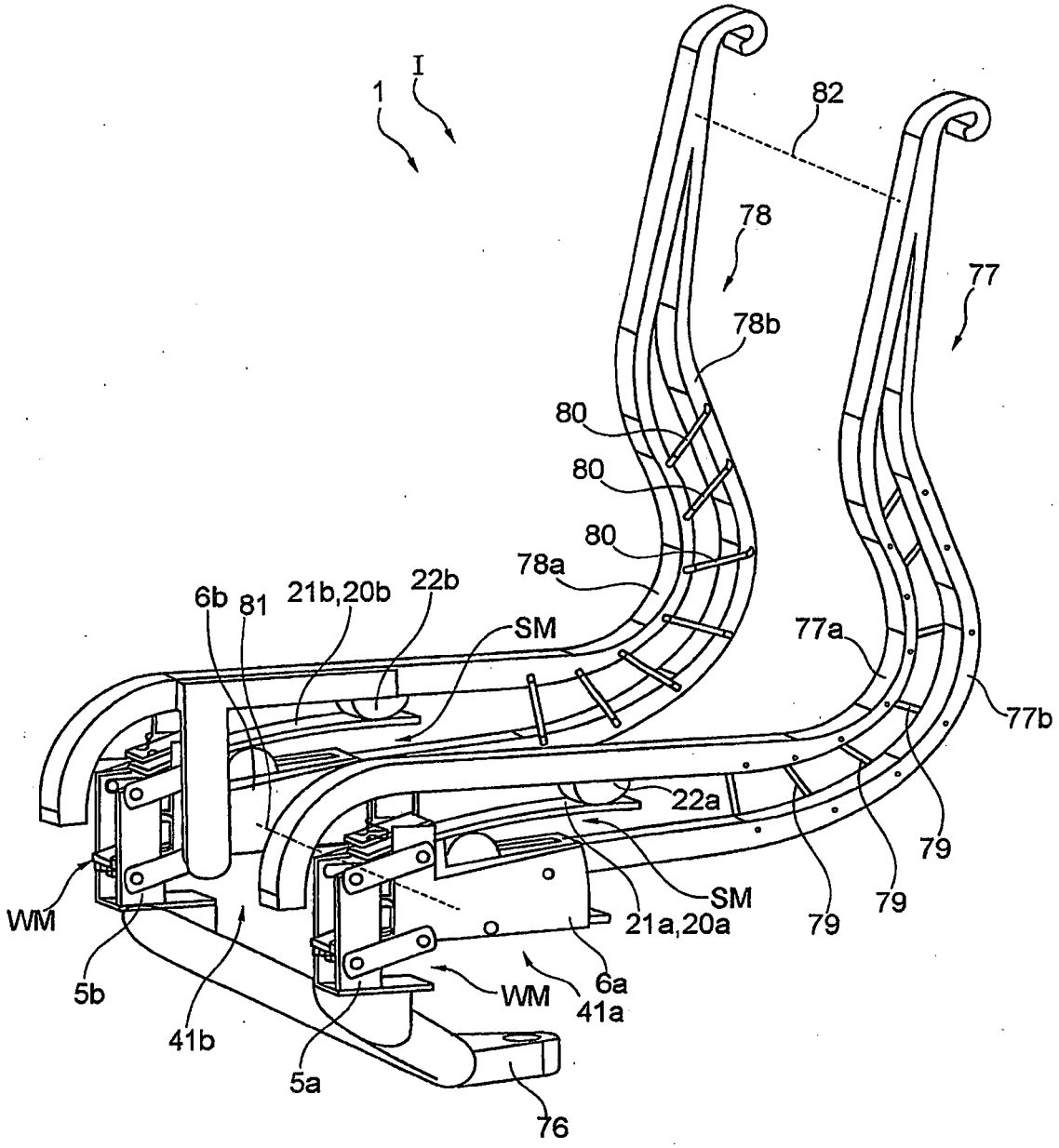
I
1
82
78
77
78b
80
80
80
78a
6b
81
21b,20b
22b
SM
77a
77b
22a
79
79
79
SM
21a,20a
WM
5b
41b
5a
WM
6a
41a
76

Fig. 7c

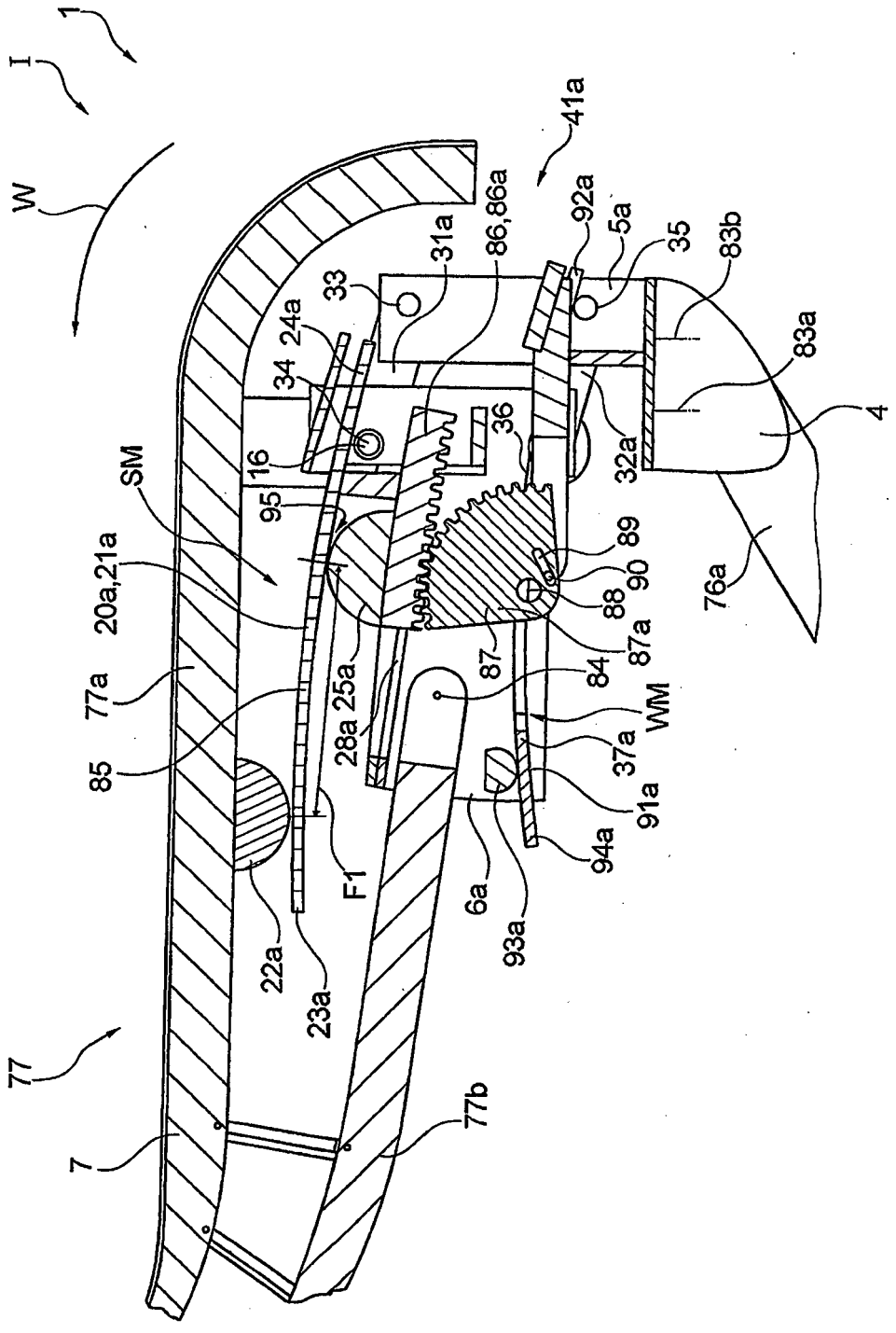
1
I
W
41a
92a
5a
35
83b
86,86a
31a
33
24a
34
83a
4
36
32a
16
SM
95
89
90
88
20a,21a
76a
87a
87
84
77a
25a
28a
WM
37a
85
91a
94a
F1
6a
93a
22a
23a
77
77b
7

Fig. 7d

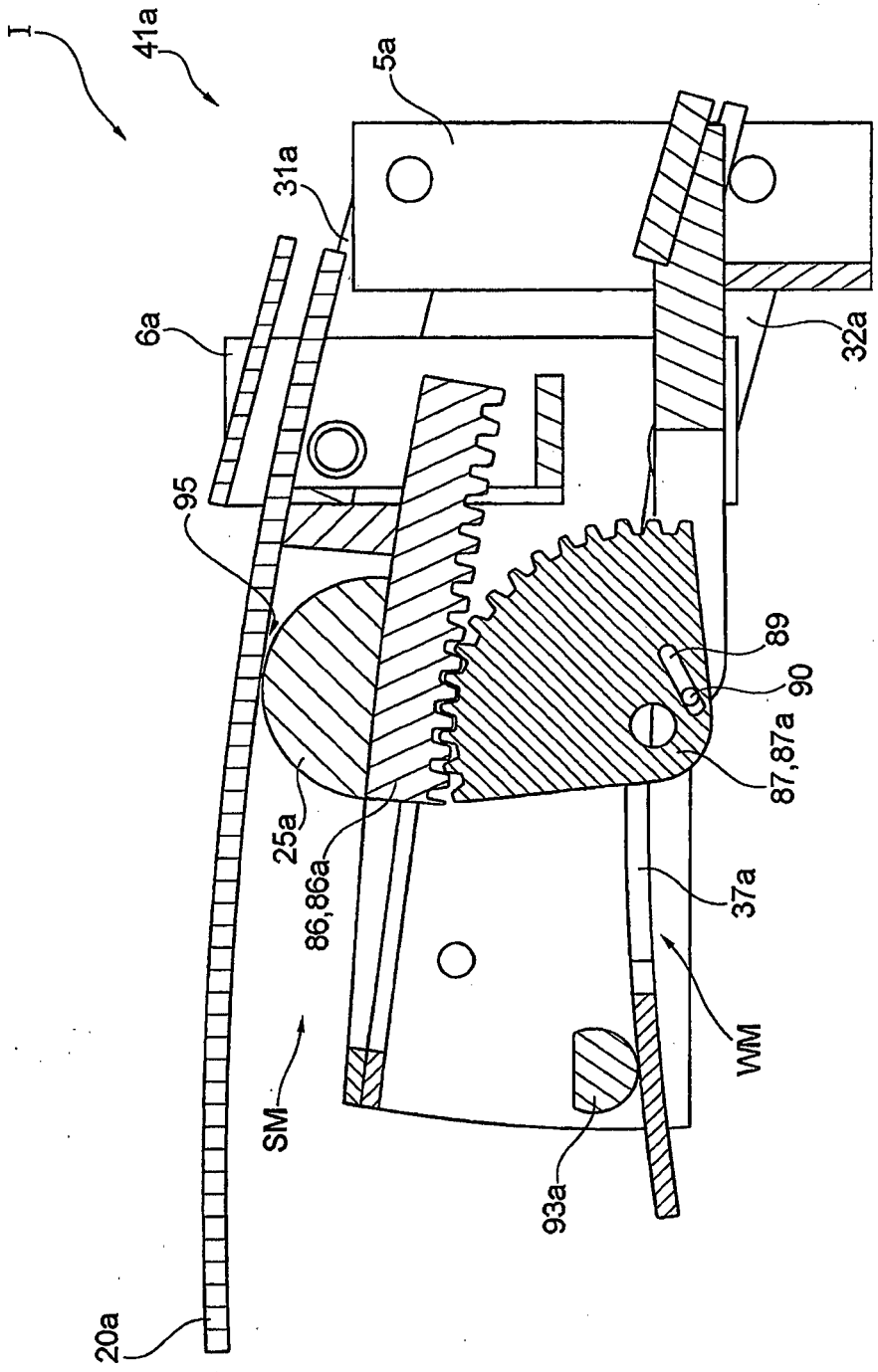

Fig. 7e

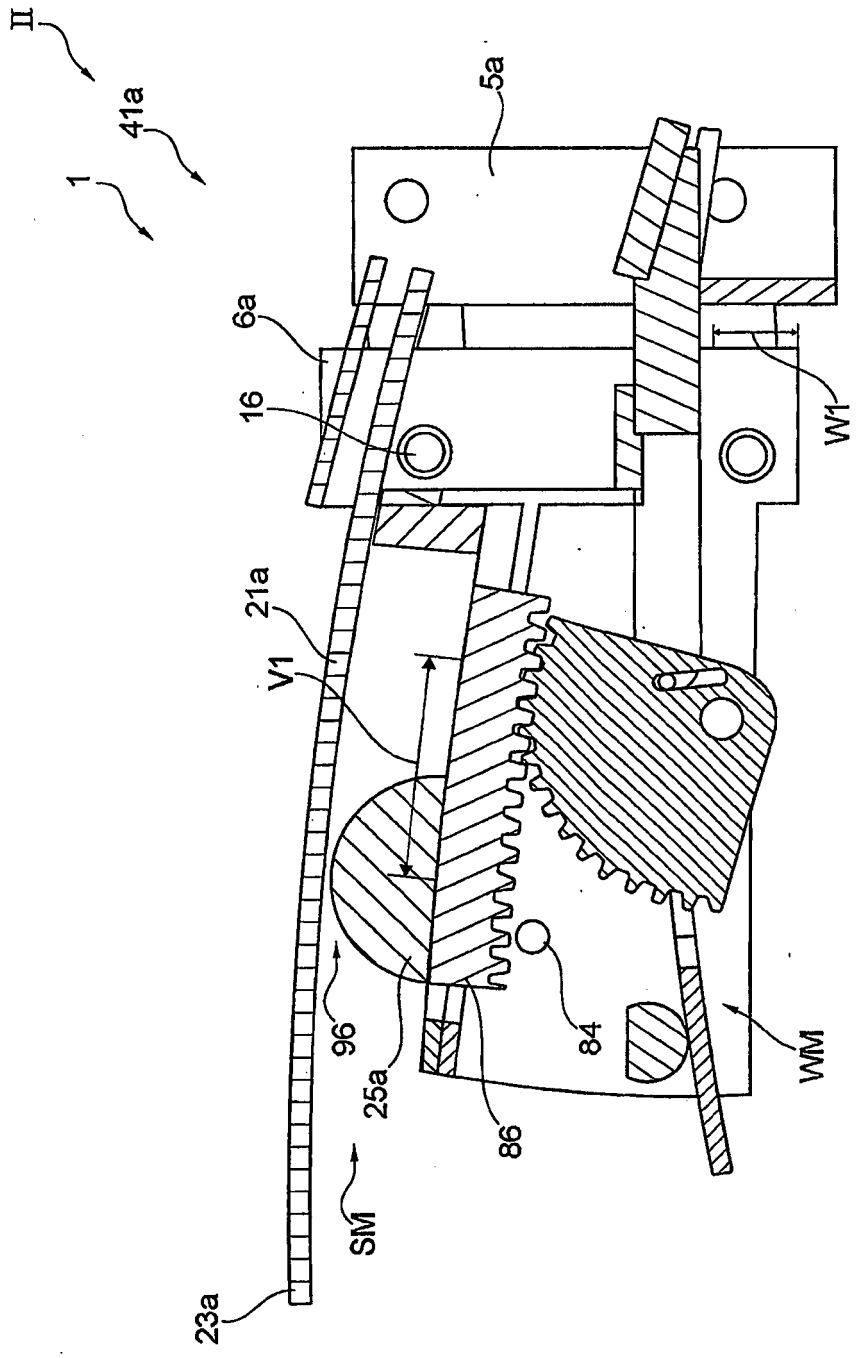

Fig. 7f

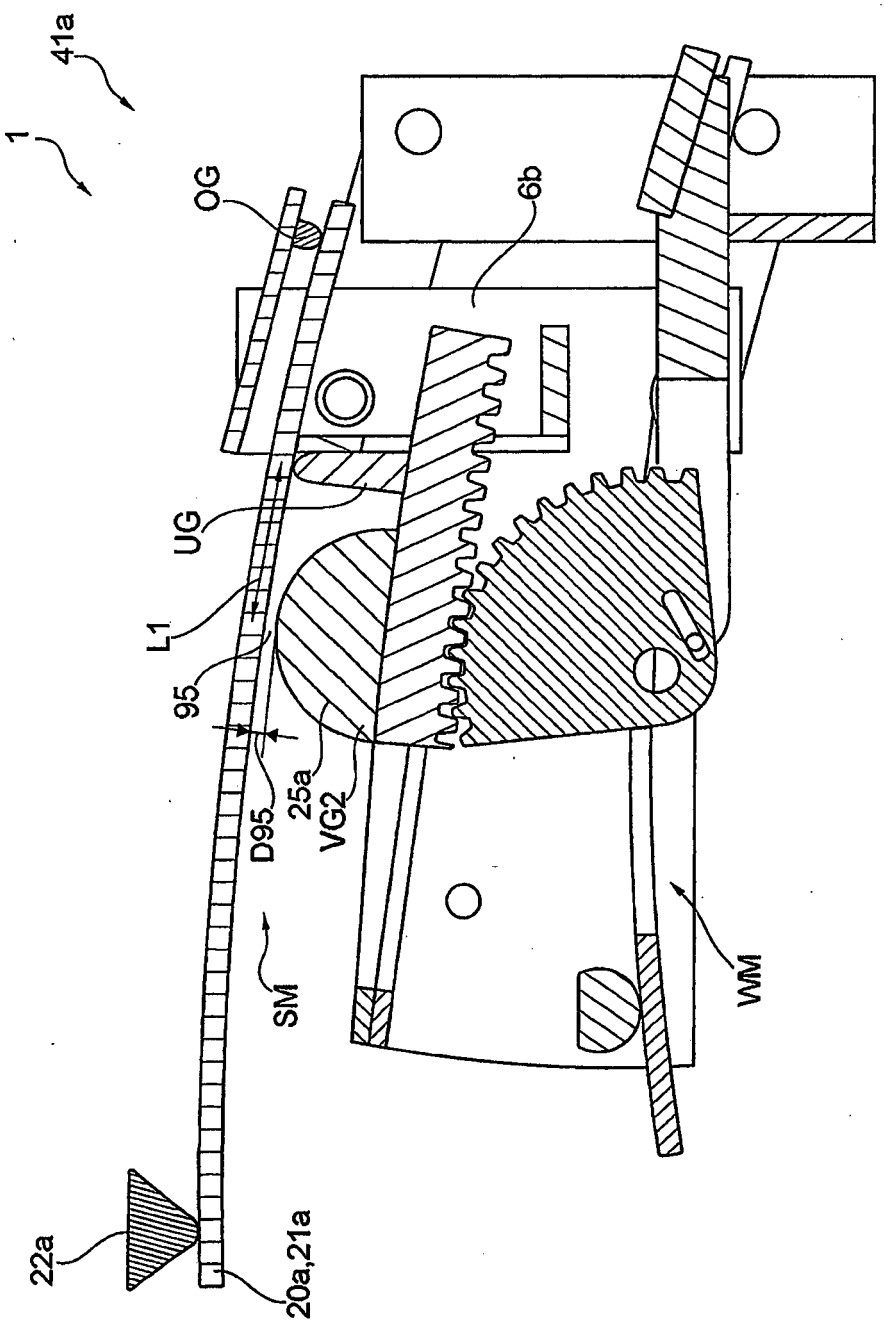

Fig. 8a

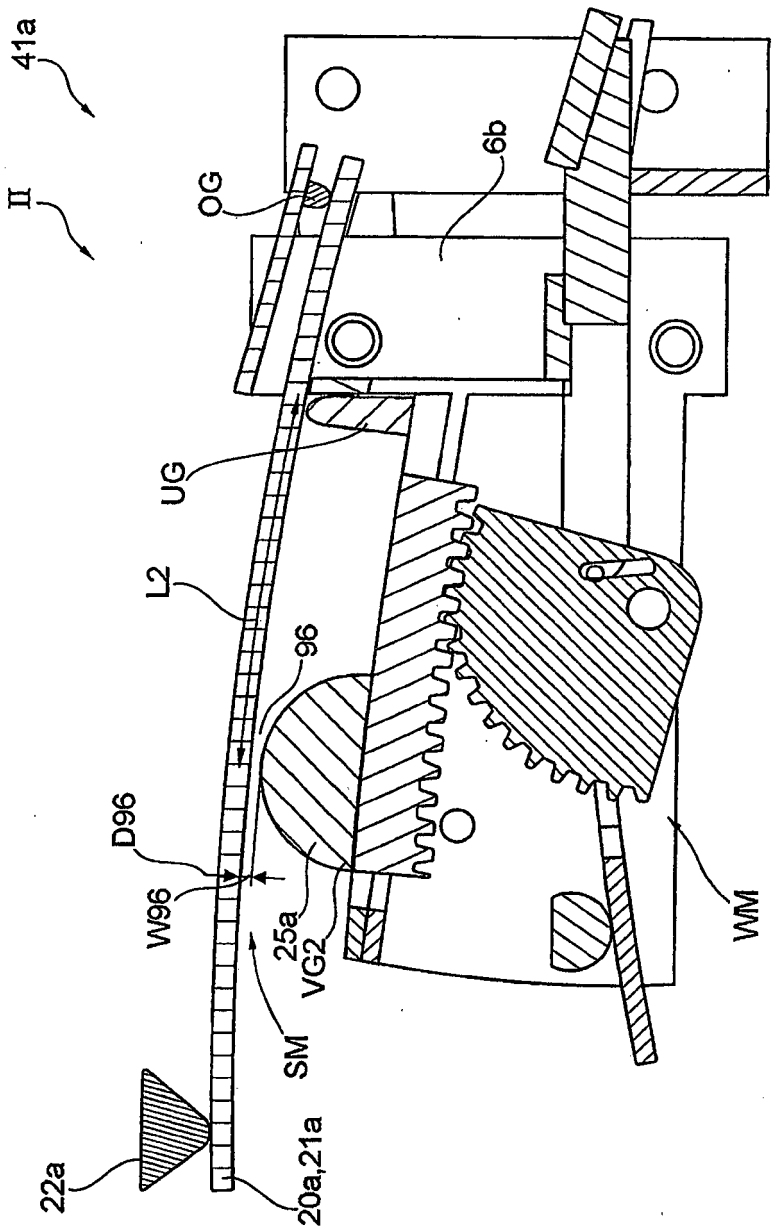

Fig. 8b

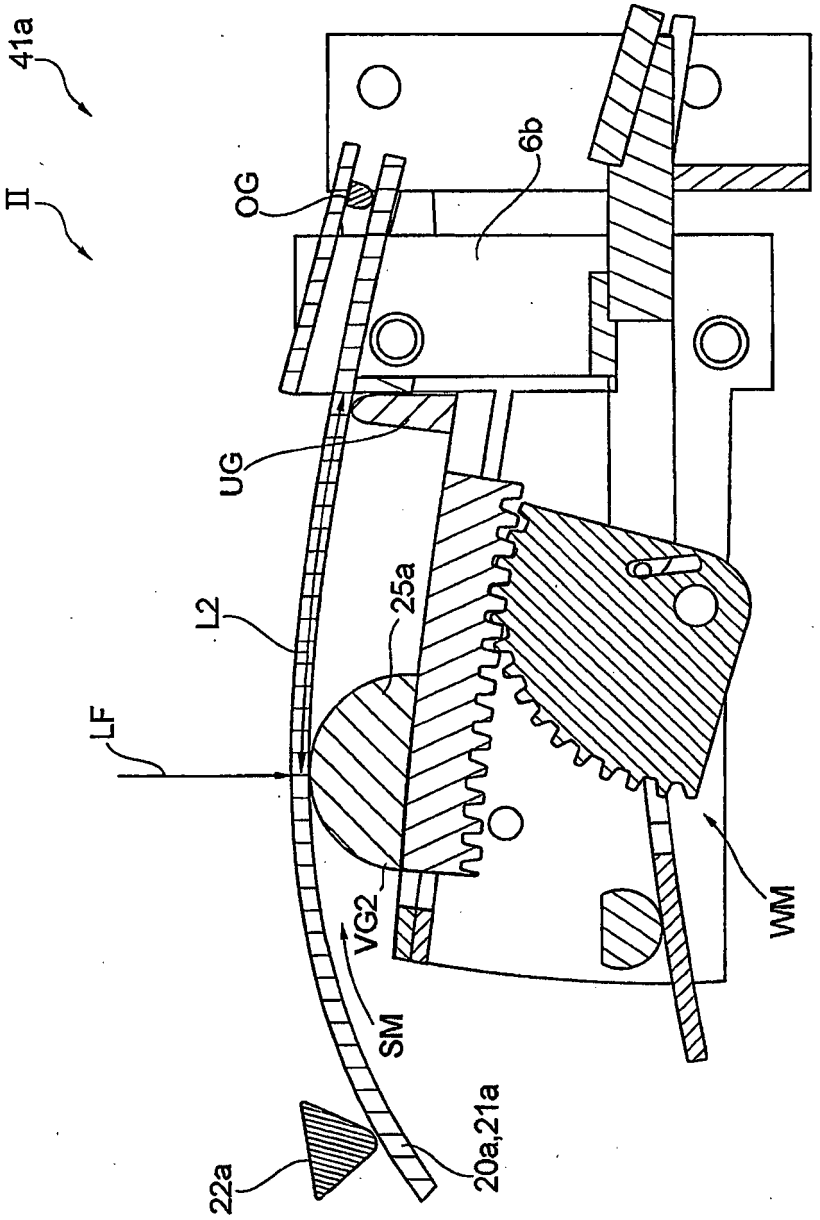

Fig. 8c

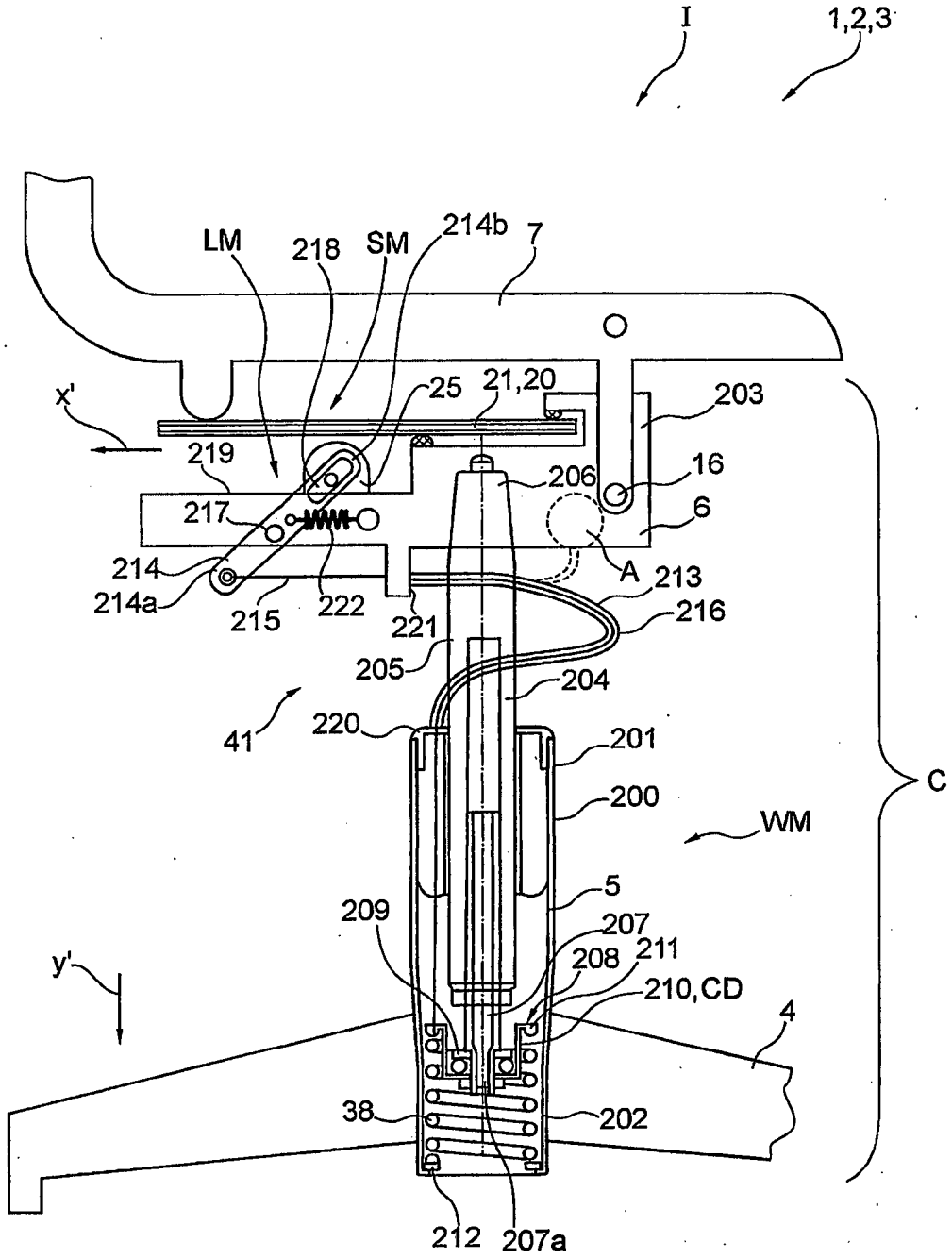
I
1,2,3
LM
218
SM
214b
7
x'
25
21,20
203
219
206
16
217
6
214
A
213
214a
215
222
221
216
205
204
41
220
201
200
C
WM
5
209
207
208
211
210,CD
y'
4
38
202
212
207a

Fig. 9a

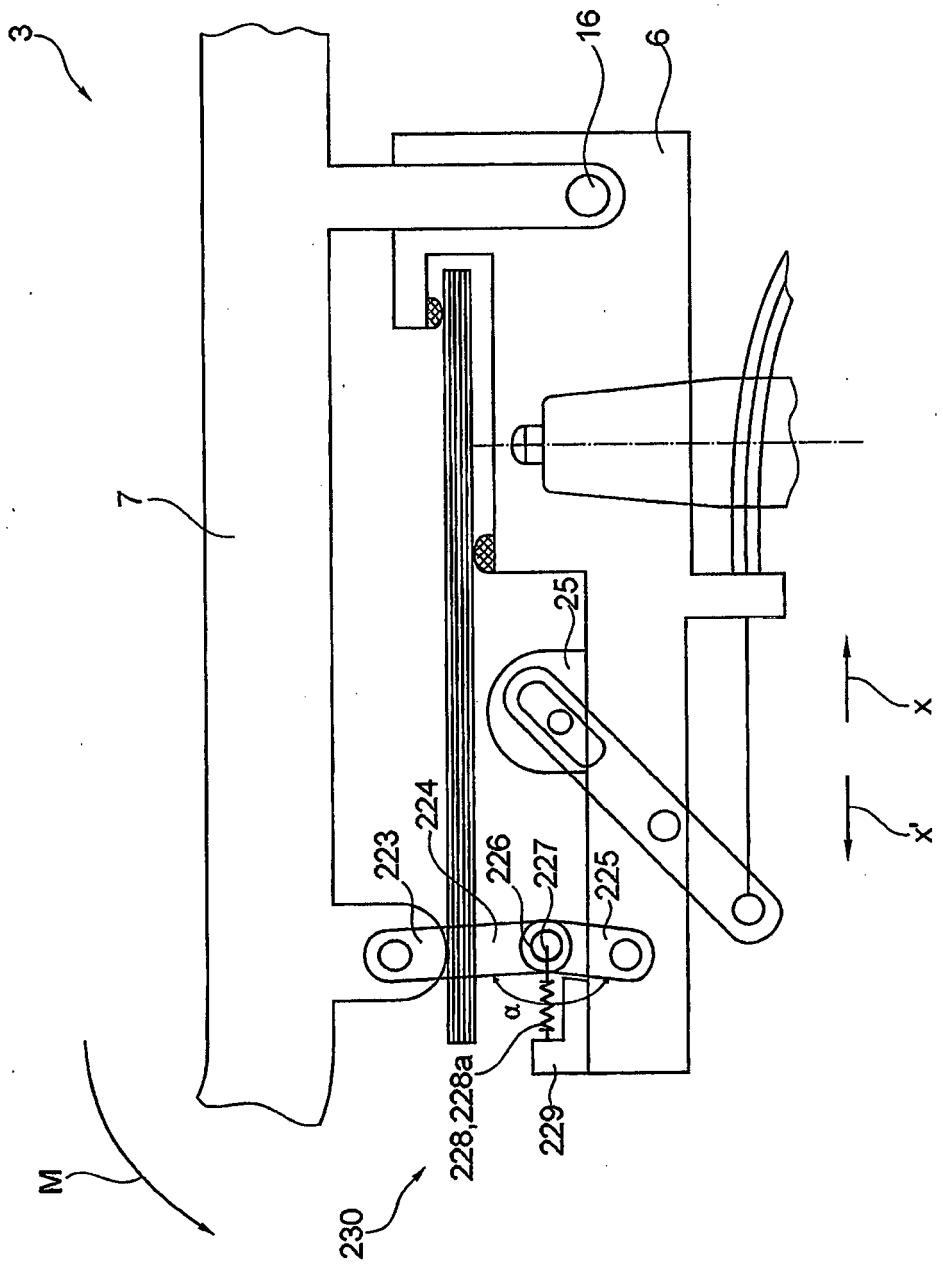

Fig. 9b

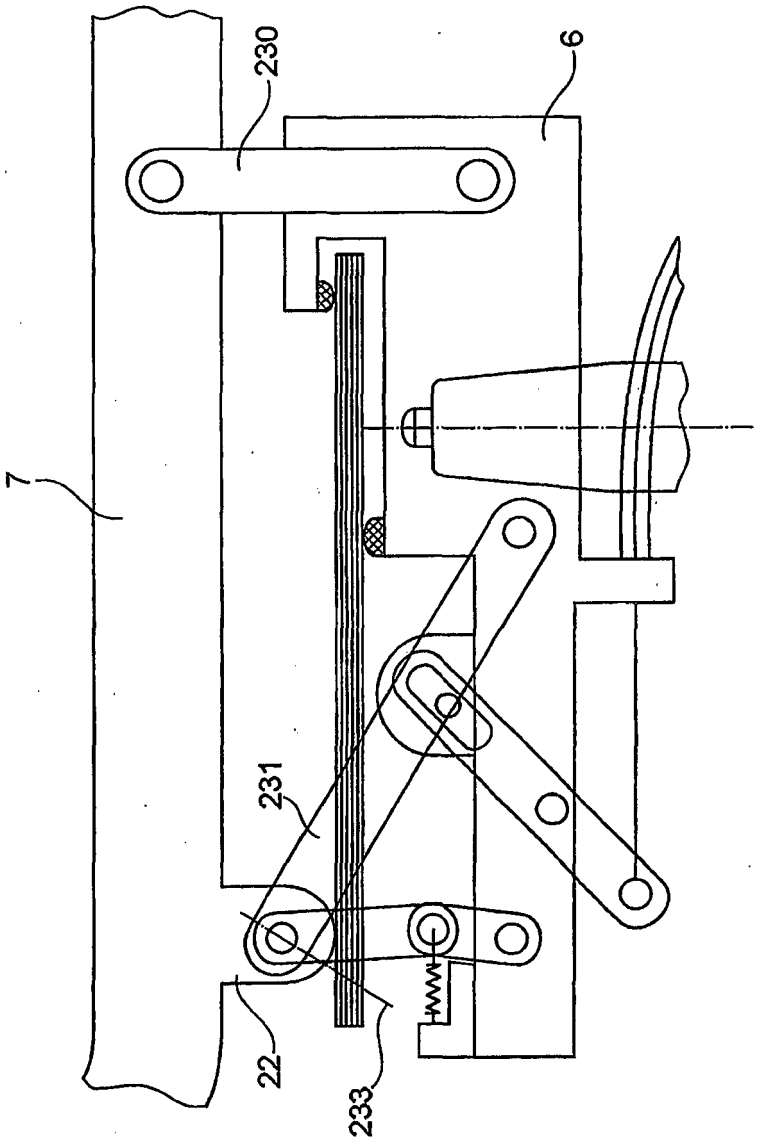

Fig. 9c

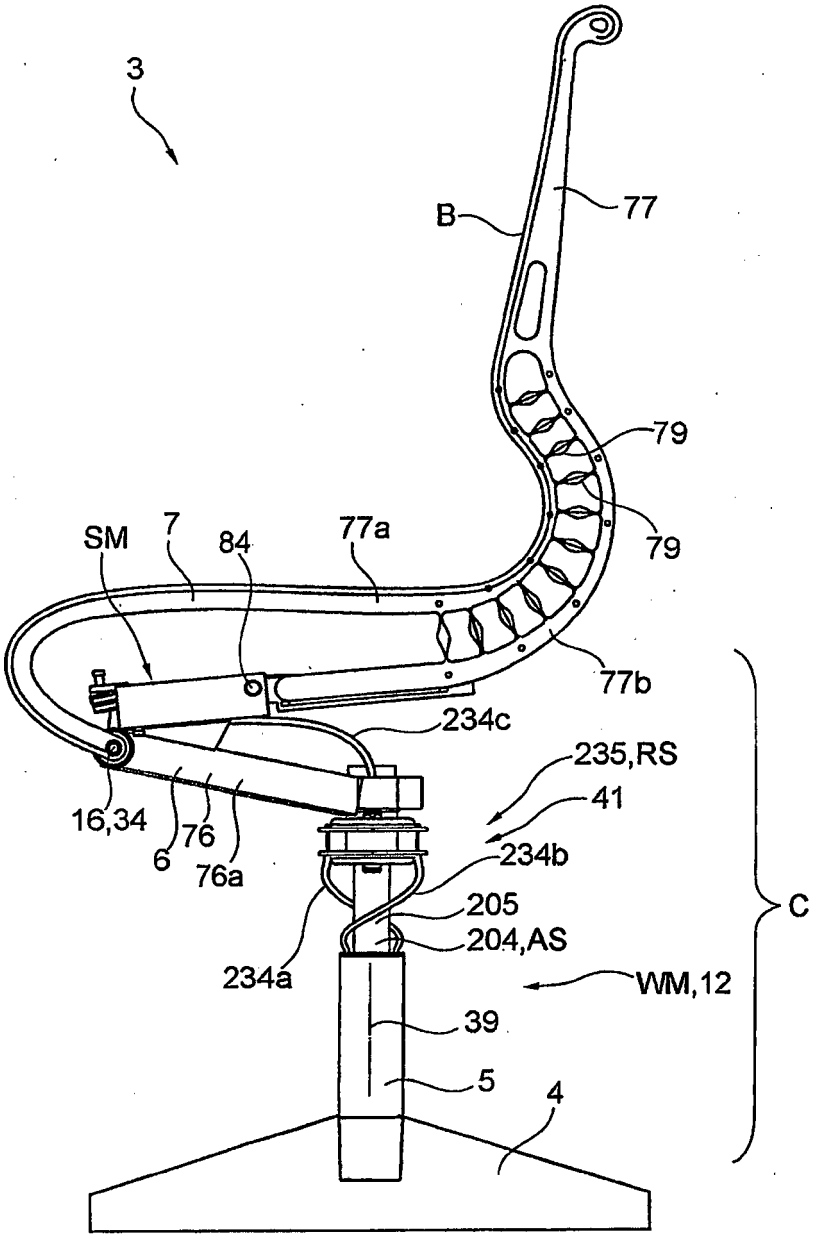
3
B
77
79
79
SM
7
84
77a
77b
234c
235,RS
41
234b
205
204,AS
WM,12
39
5
4
C
16,34
6
76
76a
234a

Fig. 10a

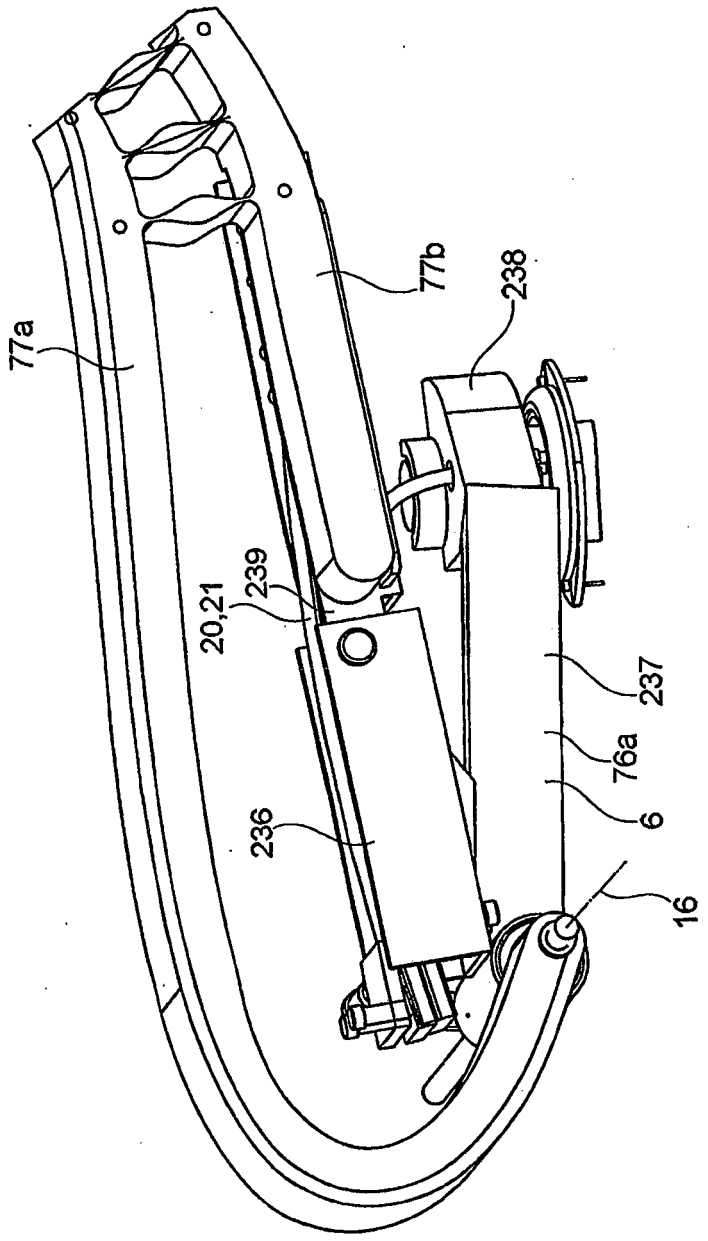

Fig. 10b

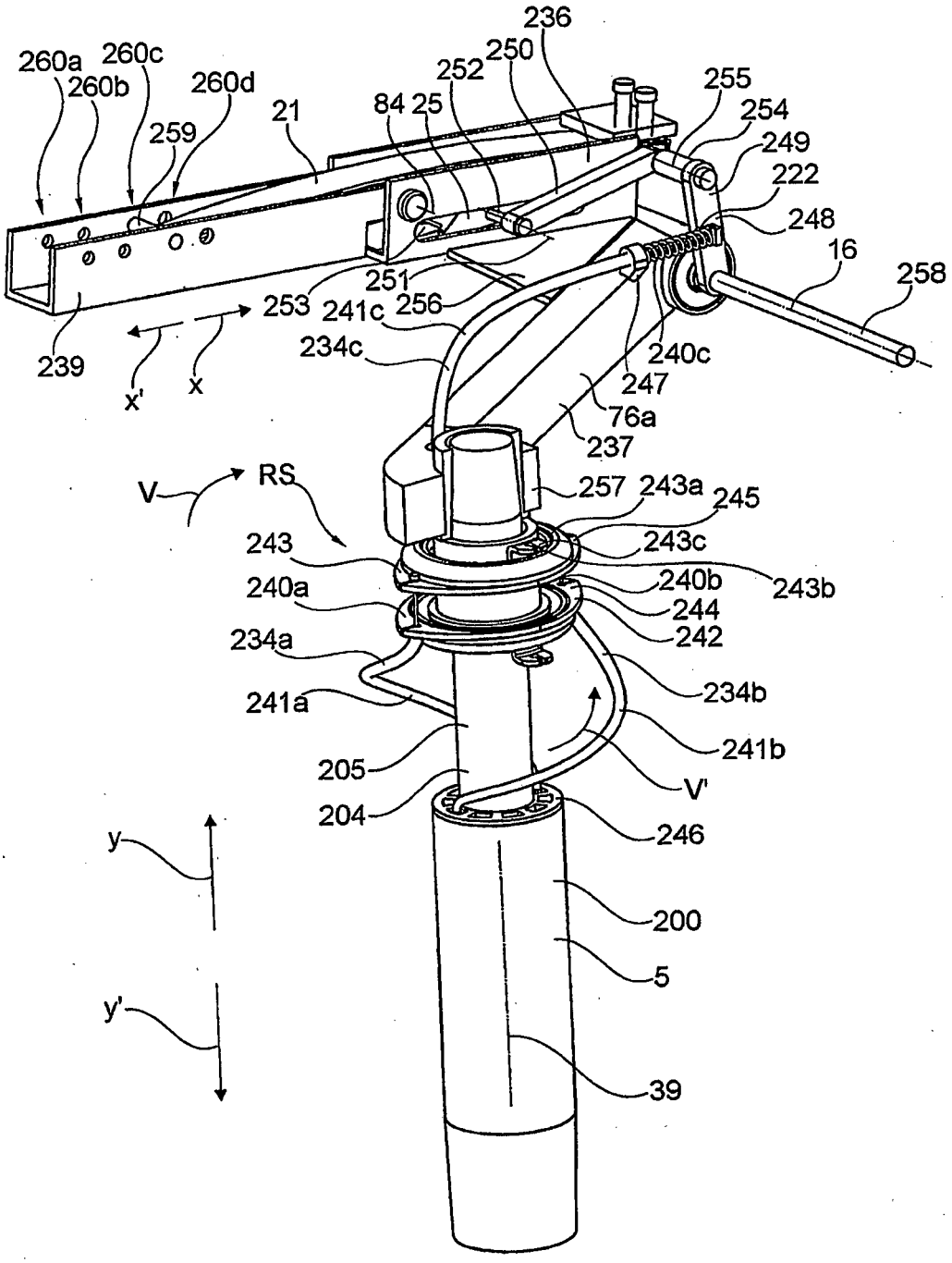
260a
260c
260b
260d
259
21
84
25
252
250
236
255
254
249
222
248
16
258
251
253
241c
256
234c
239
x'
x
240c
247
76a
237
V
RS
257
243a
245
243
243c
240a
240b
243b
244
242
234a
234b
241a
241b
205
V'
204
246
y
200
y'
5
39

Fig. 10c

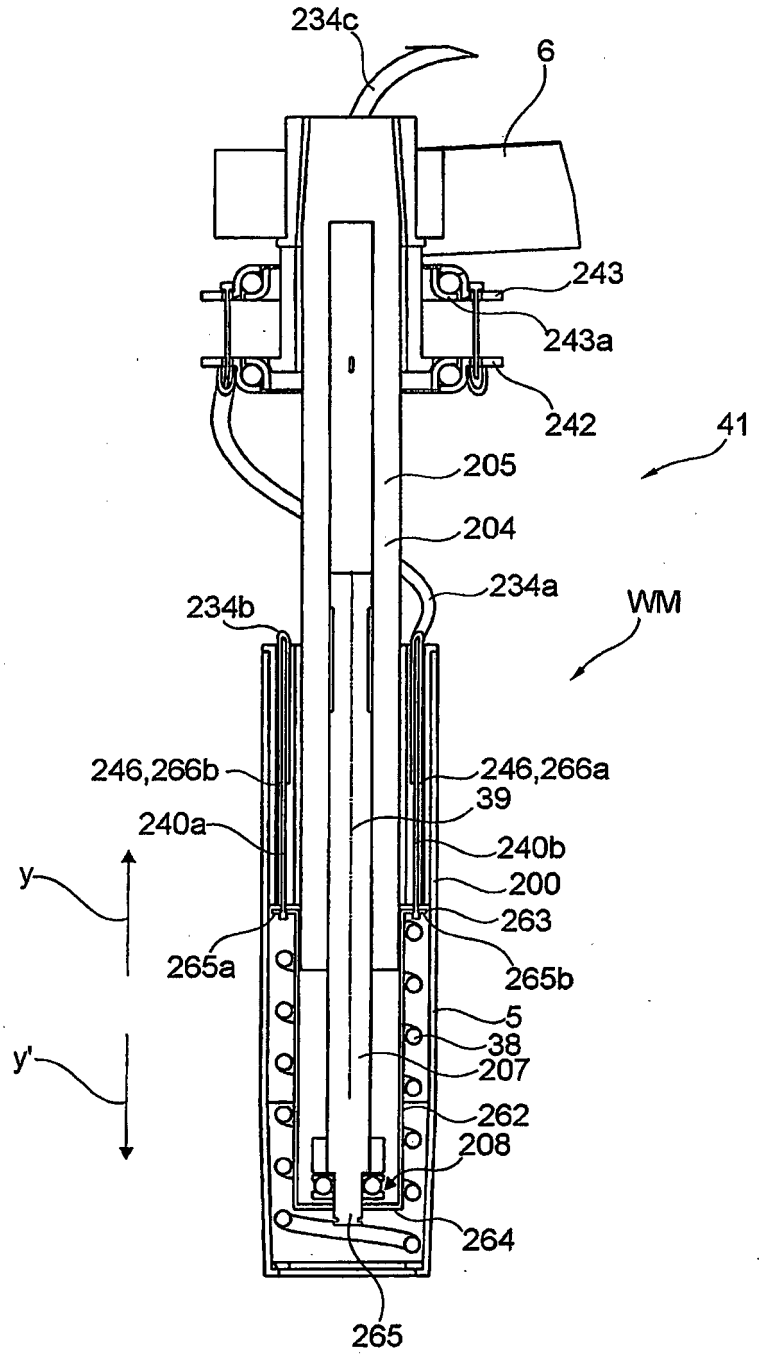
234c
6
243
243a
242
41
205
204
234a
WM
234b
246,266b
246,266a
39
240a
240b
200
263
y
265a
265b
5
38
y'
207
262
208
264
265

Fig. 10d

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 3700447 A1 **[0002]**
- US 5080318 A **[0003]**
- US 5348372 A1 **[0004]**